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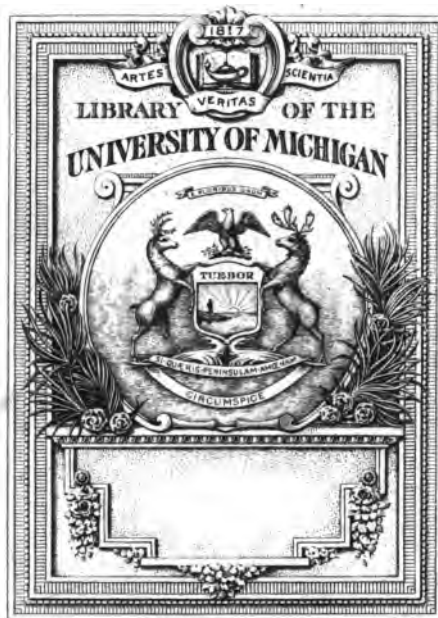
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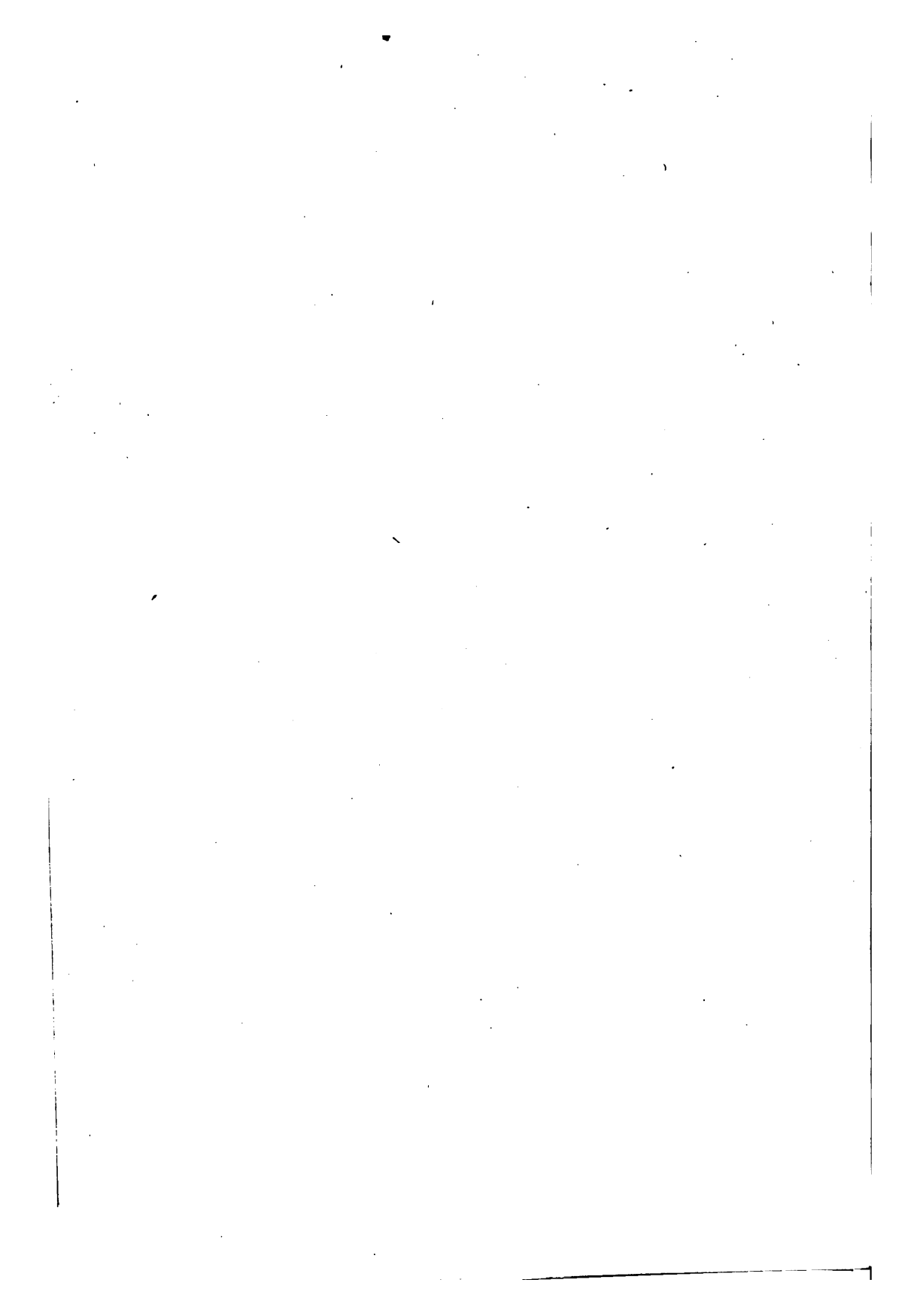
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THE TWENTY-FIRST ANNUAL REPORT
OF THE
Illinois Farmers' Institute
=

A Handbook of Agriculture



A Report of the Twenty-first Annual Meeting Held in Decatur, Illinois,
February 22, 23 and 24, 1916, Together With Other
Addresses and Reports of Institute Work for
the Year Ending June 30, 1916.

It was to encourage the development of the rich gold mines in Illinois farms that the Illinois Farmers' Institute was created, and through its various lines of dissemination it is developing an army of bright young men and women—reading, thinking and up-to-date doing farmers. What a future for the agricultural interests of Illinois!

Compiled and Edited by H. A. McKEENE, *Secretary*. **Exchange Duplicate, L. C.**
(Fifty Thousand Copies Issued.)

[Printed by authority of the State of Illinois.]



SPRINGFIELD, ILL.
ILLINOIS STATE JOURNAL CO., STATE PRINTERS.
1916



GEORGE F. TULLOCK, PRESIDENT.

N. of D.
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ILLINOIS FARMERS' INSTITUTE.

OFFICERS FOR 1916-17.

President—GEORGE F. TULLOCK, Rockford.
Vice President—D. M. MARLIN, Norris City.
Secretary—H. A. McKEENE, Springfield.
Treasurer—J. P. MASON, Elgin.
AUDITOR—FRANK I. MANN, Gilman.

BOARD OF DIRECTORS.

EX OFFICIO.

Superintendent of Public Instruction, F. G. BLAIR, Springfield.
Dean of the College of Agriculture, EUGENE DAVENPORT, Urbana.
President State Board of Agriculture, LEN SMALL, Kankakee.
President State Horticultural Society, W. S. PERRINE, Centuria.
President State Dairymen's Association, J. P. MASON, Elgin.

ELECTIVE BY CONGRESSIONAL DISTRICTS.

1st Dist.—H. E. YOUNG, 1502 Lytton Building, Chicago.
2d Dist.—AUGUST GEWEKE, DesPlaines.
3d Dist.—MERRILL K. SWEET, Glenwood.
4th Dist.—P. R. BARNES, 602 Oxford Building, Chicago.
5th Dist.—C. V. GREGORY, 538 South Clark Street, Chicago.
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7th Dist.—CHAS. GRAY, 817 Exchange Avenue, Chicago.
8th Dist.—JAS. R. CLARK, 4845 Milwaukee Avenue, Chicago.
9th Dist.—CLAYTON C. PICKETT, 814 City Hall, Chicago.
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14th Dist.—WM. H. ASHDOWN, Port Byron.
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17th Dist.—S. B. MASON, Bloomington.
18th Dist.—FRANK I. MANN, Gilman.
19th Dist.—J. B. BURROWS, Decatur.
20th Dist.—G. G. HOPPING, Havana.
21st Dist.—EDWARD GRIMES, Raymond.
22d Dist.—E. W. BURROUGHS, Edwardsville.
23d Dist.—CHAS. E. PALMER, Noble.
24th Dist.—D. M. MARLIN, Norris City.
25th Dist.—H. M. AIKEN, Benton.

STANDING COMMITTEES.

EXECUTIVE.

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FRANK S. HAYNES. A. N. ABBOTT.

AUDITING.

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JAMES R. CLARK. MERRILL K. SWEET.

LEGISLATIVE.

FRANK S. HAYNES. FRANK I. MANN. CHARLES GRAY.
E. W. BURROUGHS. RALPH ALLEN.

HOUSEHOLD SCIENCE.

S. B. MASON. R. B. SWIFT. J. P. MASON.
EDWARD GRIMES. WM. H. ASHDOWN.

AGRICULTURAL BOOKS.

EUGENE DAVENPORT. F. G. BLAIR. H. M. AIKEN.
J. B. BURROWS. C. V. GREGORY.

HIGHWAY.

E. W. BURROUGHS. D. M. MARLIN. G. G. HOPPING.
CHAS. E. PALMER. R. C. VIAL.

ENTOMOLOGY.

FRANK I. MANN. J. B. BURROWS.

SOIL INVESTIGATION AND EXPERIMENTS.

RALPH ALLEN. A. N. ABBOTT. C. V. GREGORY.
J. P. MASON. FRANK I. MANN.



Geo. F. Tullock Pres.



D. W. Martin V. Pres.



H. A. McKeene, Secy.



J. P. Mason, Treas.



Frank I. Mann, Auditor

LETTER OF TRANSMITTAL.

To His Excellency, Edward F. Dunne, Governor of Illinois.

DEAR SIR: I have the honor to transmit herewith the Twenty-first Annual Report of the Illinois Farmers' Institute for the fiscal year ending June 30, 1916.

Very respectfully yours,

H. A. McKEENE, *Secretary.*

Springfield, Ill., July, 1916.

AN ACT CREATING THE ILLINOIS FARMERS' INSTITUTE.

Approved June 24, 1895. Amended and approved May 11, 1901. Amended and approved May 15, 1903. Amended and approved June 10, 1909.

SECTION 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly:* That to assist and encourage useful education among the farmers, and for developing the agricultural resources of the State, that an organization under the name and style of "Illinois Farmers' Institute" is hereby created, and declared a public corporation of the State.

SEC. 2. It shall consist of three delegates from each county of the State, elected annually at the farmers' institutes for said county by the members thereof.

SEC. 3. The affairs of the Illinois Farmers' Institute shall be managed by a board of directors, consisting of:

1. State Superintendent of Public Instruction.
2. Professor of Agriculture of the State of Illinois.
3. President of the State Board of Agriculture.
4. President of the State Horticultural Society.

5. President of the State Dairymen's Association, and one member from each congressional district of the State, to be selected by the delegates from the district present at the annual meeting of this organization: *Provided*, that the members first selected from the congressional districts of even numbers shall serve for one year, and the members first selected from the congressional districts of odd numbers shall serve for two years, and that the members selected thereafter to fill the expired terms of office shall serve for the period of two years.

SEC. 4. (As amended and approved June 10, 1909.) The Board of Directors of the Illinois Farmers' Institute shall have sole care and disposal of all sums that may be appropriated by the State to sustain the organization, and shall expend the same in such manner as in their judgment will best promote the interests in useful education among the farmers and develop the agricultural resources of the State. The Illinois Farmers' Institute shall make annual report to the Governor of its transactions, which report shall include papers pertaining to its work and addresses made at the annual meeting of the organization, and a classified statement of all money received and of all expenditures made, and fifty thousand (50,000) copies of such report shall be printed and bound in cloth on or before September 1 of each fiscal year, three-fourths for the use of the Illinois Farmers' Institute, and the remainder to the Secretary of State for distribution. It shall make no appropriation without funds in hand to meet the same, and the State of Illinois shall in no event be held liable or responsible for debt, obligation or contract made by the Illinois Farmers' Institute or its Board of Directors.

SEC. 5. There shall be held annually, under the direction of the Board of Directors, between October 1 and March 1, following of each year, a public meeting of the delegates from county farmers' institutes and of farmers of this State at such time and place as may be determined by the Board of Directors, of not less than three (3) days' duration, which meeting shall be held for the purpose of developing the greater interest in the cultivation of crops, in the care and breeding of domestic animals, in dairy husbandry, in horticulture in farm drainage, in improved highways and general farm management through and by means of liberal discussion of these and kindred subjects and any citizen may take part in these meetings, but only duly elected and accredited delegates from county farmers' institutes shall be permitted to vote in the election of the Board of Directors.

SEC. 6. (As amended and approved May 15, 1903.) The members of each new Board of Directors shall enter upon their duties the second Tuesday

after their election, and hold their offices for one or two years, as provided in section 3, or until their successors are elected and enter upon their duties. The Board of Directors shall have power to fill vacancies in the board. It shall organize by the election of a president, vice president, treasurer and secretary, who shall hold their offices for one year, their term of office to begin July 1 following their election. It shall employ such superintendents, speakers and clerks as may be deemed proper for organizing and conducting the work of the Illinois Farmers' Institute, and provide for their compensation by the rules of the Board of Directors. The secretary and treasurer may be other than members of the Board of Directors. The salary of the secretary shall be two thousand dollars (\$2,000) a year, payable in monthly installments.

The Auditor of Public Accounts is hereby authorized to draw his warrants on the State Treasurer monthly for the salary of the secretary of the Illinois Farmers' Institute, as herein provided, payable out of any fund in his hands not otherwise appropriated.

Sec. 7. Rooms in the Capitol building shall be assigned to the officers of this organization by the proper authority, which shall then be under the control of the Board of Directors.

Sec. 8. The Board of Directors may make and enforce such rules and by-laws, not in conflict with the laws of this State, as will render its work most useful and efficient.

Sec. 9. For the purpose mentioned in the preceding sections, said Board of Directors may use such sums as it may deem proper and necessary, not exceeding the amount appropriated therefor by the General Assembly from the general fund, for that purpose: *Provided, further, that the*

1. State Superintendent of Public Instruction,
2. Professor of Agriculture of the University of Illinois,
3. President of the State Board of Agriculture,
4. President of the State Horticultural Society,
5. President of the State Dairymen's Association,

And the present congressional representatives of the Illinois Farmers' Institute Association shall constitute the first Board of Directors of this organization, who shall have charge of the affairs of the same until their successors have been duly elected, and enter upon their duties as provided in this act.

BY-LAWS OF ILLINOIS FARMERS' INSTITUTE.

Whereas, by act of the Thirty-ninth General Assembly, approved June 24, 1895, the Illinois Farmers' Institute was created, empowering its Board of Directors to adopt by-laws for its government and management of its business in connection with the act creating it, it hereby adopts the following by-laws and hereby repeals all former by-laws heretofore adopted by the Board of Directors.

ARTICLE I—DIRECTORS.

SECTION 1. Eleven members of the Board of Directors shall constitute a quorum for the transaction of business, except as may be otherwise provided by these by-laws.

Sec. 2. The Board of Directors shall hold a meeting in the institute rooms at the Statehouse, on the second Tuesday after the annual meeting of the Illinois Farmers' Institute, the old board to dispose of its business, the new board to organize, elect officers and outline its policy for the ensuing year, and to transact such other business as may come before the boards.

Sec. 3. Each director shall be the confidential adviser of the board and of the superintendent of institutes concerning institute affairs in his district; he shall report to the superintendent at the close of the institutes in his district upon all matters that seem significant to his work, in order that the superintendent may have a complete knowledge of the actual conditions in all parts of the State.

ARTICLE II—OFFICERS.

SECTION 1. The officers of the Board of Directors shall consist of a president, vice president, superintendent of institutes, secretary, treasurer and an auditor, to be elected by ballot by the Board of Directors, for the term of one year, whose term of office shall begin July 1 after their election.

SEC. 2. All officers of the Board of Directors must be members of the board, except the superintendent of institutes, the treasurer and the secretary.

SEC. 3. The Board of Directors shall have power at any time to fill vacancies which may occur in its membership.

SEC. 4. The compensation of all officers and employees shall be fixed previous to their election or employment.

ARTICLE III—PRESIDENT AND VICE PRESIDENT.

SECTION 1. The president shall be the chief executive officer of the Board of Directors; shall appoint all committees; shall be ex officio member of all standing committees; he shall preside over the meetings of the Illinois Farmers' Institute, the Board of Directors and the Executive Committee, sign all warrants for expenditures approved by the auditor, Executive Committee or Board of Directors, and perform all duties incumbent on a presiding officer.

SEC. 2. In case of the absence or disability of the president, or in case of vacancy in that office, the vice president shall fill the office.

SEC. 3. In case of the absence or disability of these officers, or in case both offices become vacant, any director or member of the Executive Committee who is called to the chair shall act as president for the time being, and sign all necessary papers.

ARTICLE IV—SUPERINTENDENT OF INSTITUTES.

SECTION 1. The superintendent of institutes shall have his headquarters in the institute rooms at the Statehouse in Springfield, and shall devote his entire time to the organization, promotion and general supervision of the farmers' institute work in the State, under the direction of the Board of Directors and of the Executive Committee.

SEC. 2. He shall organize a bureau of speakers, the same to include farmers, dairymen, horticulturists, live stock breeders, feeders and others who have adopted scientific and practical methods—secured beneficial results, and are able to tell about them, together with such instructors from the College of Agriculture and Experiment Station as may be assigned to the institute work, and whose allotment of time shall be under his direction. These speakers shall be assigned work, as far as possible, in accordance with the wishes of the district directors, officers of the Department of Household Science (where their interests may appear) and the county institute officers.

SEC. 3. The superintendent of institutes shall attend the district conferences and aid in the arrangement of such circuits of institutes as will prove the most convenient for the attendance of speakers. He shall make a detailed annual report in writing to the Board of Directors, at its last meeting, of his acts and doings during the year, together with a general summary of the institute work of the State for the year; he shall also make such other reports during the year as the Board of Directors or Executive Committee may require.

SEC. 4. He shall make recommendations as to lines of work which he believes will prove profitable for the ensuing year, together with general plans for their execution and estimates of expense. He shall prepare his report for publication in the annual report and submit it, together with such other matter as he may deem advisable to appear in the report, to the secretary and Executive Committee by July 15 of each year.

ARTICLE V—DUTIES OF THE SECRETARY.

SECTION 1. The secretary shall attend all meetings of the Board of Directors and standing committees, and shall keep a correct record of the

same. He shall perform such other duties as usually devolve upon such officer. He shall act as secretary of the annual meeting of the delegates and keep a record of same. He shall issue and countersign warrants for expenditures duly approved by the auditor, Executive Committee or Board of Directors, but shall not draw a warrant on a fund unless there is sufficient money in the fund to pay such warrant.

SEC. 2. He shall have charge of all publications of the institute and shall insert therein such matter as will advance the agricultural interests, and especially the work of the Illinois Farmers' Institute, under the direction of the Executive Committee. He shall supply the superintendent of institutes with stenographic service, filing and other office facilities. He shall arrange for and secure reports of State and other important institute meetings, making them a matter of record.

SEC. 3. The secretary shall be the custodian of all the records and papers belonging to, and all property owned by the Illinois Farmers' Institute, and shall report an inventory of all property of the Illinois Farmers' Institute to the Board of Directors at the close of each year; he shall make a detailed annual report in writing to the Board of Directors at the last meeting of the old board; he shall also make such other reports during the year as the Board of Directors or the Executive Committee may require.

ARTICLE VI—DUTIES OF TREASURER.

SECTION 1. The treasurer shall have charge of all funds, keeping a separate account with each fund. He shall pay out the same on warrants signed by the president and countersigned by the secretary, issued on approved bills. He shall, before entering upon the duties of his office, execute a bond signed by not less than two sureties, in the penal sum prescribed by the Board of Directors, not less than twice the sum likely to come into his possession at any one time; said bond shall be approved by the Board of Directors or committee duly authorized by the board to approve the same.

ARTICLE VII—AUDITOR.

SECTION 1. All bills for expenditures ordered by the Board of Directors or the Executive Committee and all bills contracted in pursuance of any appropriation shall be referred to the auditor.

SEC. 2. The auditor shall carefully examine all bills, and, when approved, shall return them to the secretary with recommendation that warrants be drawn in payment of the same. In case a bill is not approved, it shall be referred to the Executive Committee.

SEC. 3. The auditor shall carefully examine all reports from county farmers' institutes and the bills for expenses of the same, and if in compliance with the law providing appropriations for county farmers' institutes and the rules prescribed by the Board of Directors either approve the same, or if not approved, refer them to the Executive Committee.

SEC. 4. The auditor shall examine the books and records of the secretary and treasurer and make a detailed report of their financial transactions up to July 1, of each year, to the Board of Directors, and at other times when directed to do so by the Board of Directors or the Executive Committee, and shall report the accounts against which no warrants have been drawn, in the different funds, and the balances in the hands of the treasurer to the credit of each fund.

ARTICLE VIII—STANDING COMMITTEES.

SECTION 1. There shall be created the following standing committees, the president appointing four members of each committee:

Executive Committee,
Legislative Committee,
Household Science,
Committee on Agricultural Books,
Highway Committee,
Entomology,
Committee on Soil Investigation and Experiments.

SEC. 2. The duties of standing committees, unless otherwise provided by these by-laws, shall be legislative in character; they shall meet at the same time and place that the Board of Directors' meetings are called, and at such other times as may be necessary, and shall make a written report to the Board of Directors at their annual meeting and at such other times as may be called for, said report to show progress made and future needs in their respective lines of work.

ARTICLE IX—EXECUTIVE COMMITTEE.

SECTION 1. The Executive Committee shall conduct the affairs of the Illinois Farmers' Institute in the interval between the meetings of the Board of Directors in accordance with the rules and resolutions adopted by said board.

SEC. 2. It shall make all arrangements for holding the State Farmers' Institute meeting, assigning the time and place.

SEC. 3. It shall prepare a list of speakers for the use of county farmers' institutes.

SEC. 4. It shall pass on all bills referred to it by the auditor of the board.

SEC. 5. It shall be official adviser of the superintendent of institutes when the Board of Directors is not in session.

SEC. 6. It shall meet on the call of the president of the Board of Directors.

ARTICLE X—LEGISLATIVE COMMITTEE.

SECTION 1. The Legislative Committee shall prepare the bill or bills to be presented to the Legislature for enactment, and when the same have been approved by the Board of Directors or Executive Committee, shall take all necessary measures to have the same enacted.

ARTICLE XI—HOUSEHOLD SCIENCE COMMITTEE.

SECTION 1. The Committee on Domestic Science shall counsel with the State Domestic Science Association and report upon measures for the advancement of their work.

ARTICLE XII—AGRICULTURAL BOOK COMMITTEE.

SECTION 1. The Agricultural Book Committee shall examine, and recommend, from time to time, such agricultural books as it may find to be true, scientific and applicable to Illinois conditions, and to recommend books for institute office library.

ARTICLE XIII—HIGHWAY COMMITTEE.

SECTION 1. The Highway Committee shall cooperate with the State Highway Commission in its efforts to secure good roads and shall report from time to time such measures as may be recommended for the improvement of public highways.

ARTICLE XIV—ENTOMOLOGY.

SECTION 1. The Committee on Entomology shall be advisory to the State Entomologist in planning experiments for the prevention of damage to crops by injurious insects, and make report to the Board of Directors of the progress of the work.

ARTICLE XIV—COMMITTEE ON SOIL INVESTIGATION AND EXPERIMENTS.

SECTION 1. The Committee on Soil Investigation and Experiments shall advise and cooperate with the director of the Agricultural Experiment Station in making chemical and physical examination of the various soils of the State, and in ascertaining by direct experiment in laboratory and field, the crops and treatment best suited to each; it shall visit the soil experiment fields and report to the board the results of the investigations and experiments.

ARTICLE XV—AMENDMENTS.

SECTION 1. These by-laws may be amended at any regular meeting of the Board of Directors by a majority of those present voting in the affirmative.

ARTICLE XVI—RULES.

SECTION 1. Robert's Rules of Order shall govern in all cases not otherwise provided for.

RULES FOR THE MANAGEMENT OF COUNTY FARMERS'
INSTITUTES.

RULE 1. The director of each district consisting of more than one county shall, at the request of the Executive Committee, or the superintendent of institutes, call a conference of delegates from the several counties of his district, at some convenient point, consisting of the following:

(a) One officer (or person selected by the officers) of each county farmers' institute.

(b) One officer (or person selected by the officers) of the department of household science of each county farmers' institute. (In counties in which the department is not organized, the officers of the county farmers' institute may appoint a delegate to represent the women of the county with the express understanding that said delegate shall, prior to the time for holding the county farmers' institute, make faithful effort to organize such department.)

(c) The county superintendent of schools for each county in the district. The purpose of these conferences is to arrange the times and places for holding the next county institutes and to cooperate in securing speakers.

All necessary expenses of the three said delegates in attending the district conference shall be paid by the Illinois Farmers' Institute upon itemized bills approved by the director of the district.

NOTE 1. Rule 1 does not prohibit the attendance at the conference of more than three delegates. Indeed the number who may attend is unlimited; but the expenses of three only can be allowed from the State Institute funds.

NOTE 2. Delegates from independent institutes are invited to come to the conference at their own expense. Their requests for speakers, however, will receive the same attention by the superintendent of institutes as those coming from the regular county organizations. The purpose of the conferences is to help everybody who will assist in the dissemination of agricultural information.

RULE 2. The director's approval shall be required in fixing the dates of the institutes in his district.

RULE 3. The secretary of each county institute shall submit the completed institute program to the district director for his approval before having it printed and distributed, and this shall be done at least twenty days prior to the time for holding the institute.

RULE 4. As soon as practicable after printing the program, the secretary of each institute shall send two or more copies to each of the following:

The District Director.

Secretary H. A. McKeene, Springfield, Ill.

Each of the speakers whose names appear upon the program.

RULE 5. The date or place for holding an institute shall not be changed from that determined upon at the district conference without the approval of the district director and the superintendent of institutes.

RULE 6. No part of the State fund shall be expended for music, recitations, amusements of any kind, or for premiums.

RULE 7. No county farmers' institute meeting shall be held in connection with a street or a county fair, a political meeting, a circus, or any similar attraction.

RULE 8. The publication and mailing of a copy of these rules to each county institute officer shall be deemed sufficient notice that vouchers for expenses prohibited herein will not be paid by the State.

RULE 9. Nothing in these rules shall be so construed as to prohibit a county farmers' institute from expending its own money as the officers may deem proper. The State fund must be expended in accordance with the rules here given.

RULE 10. In the case of removal from the county or refusal to act, on the part of any county institute officer, the director of the district shall appoint a suitable person to fill the vacancy, and this appointee shall serve until his successor shall have been elected at the next regular election.

ACT MAKING AN APPROPRIATION FOR THE ILLINOIS FARMERS' INSTITUTE AND COUNTY FARMERS' INSTITUTES FOR THE YEARS 1915 AND 1916.

(Approved June 29, 1915, in force July 1, 1915.)

SECTION 1. *Be it enacted by the People of the State of Illinois represented in the General Assembly:* That there be and hereby is appropriated to the Illinois Farmers' Institute for the fiscal years beginning July 1, 1915 and 1916, the total sum of forty-nine thousand one hundred dollars (\$49,100.00), as follows:

For salary of stenographer	\$1,000.00 per annum
For salary of messenger	900.00 per annum
For salary of general field worker	1,200.00 per annum
For postage	700.00 per annum
For typewriter, multigraph and photo supplies	100.00 per annum
For towels, water and ice.....	50.00 per annum
For typewriter	90.00 per annum
For express	600.00 per annum
For freight and drayage	300.00 per annum
For telephone	100.00 per annum
For telegraph	50.00 per annum
For reporting proceedings of institutes and transcripts of same	600.00 per annum
Contingency	50.00 per annum
For adding machine	300.00
For carpet cleaner	20.00
For the per diem and necessary expenses of expert judges, instructors and speakers furnished by the board of directors for county farmers' institutes, farmers' short course in agriculture, farmers' study clubs and for the necessary expenses in promoting the development of the farmers' institute work throughout the State	6,000.00 per annum
For the actual expenses of the members of the board of directors and officers of the Illinois Farmers' Institute, in the performance of their duties as such members and officers, for the expenses of the district conference and the expenses of the State institute meetings.....	5,000.00 per annum
For the purpose of holding one or more farmers' institute meetings in each of the 102 counties of the State, the sum of seventy-five dollars (\$75.00) each per annum	7,650.00 per annum

And the said farmers' institute meetings shall be held at such times and at such places in each county as may be agreed upon by the county farmers' institute officers and the director of the congressional district.

The board of commissioners of State contracts shall provide all needful books, papers, stationery and printing on requisition by the secretary of the Illinois Farmers' Institute.

SEC. 2. If the officers of a county farmers' institute fail to arrange for and hold farmers' institute meetings as provided for in this act, the board of directors of the Illinois Farmers' Institute, through its officers and assistants, may plan, promote, furnish instructors for, and hold such meetings in said county as in the judgment of the board of directors may be beneficial to the agricultural interest of said county; the expense of said meetings shall be paid out of any funds available for that purpose.

SEC. 3. On the order of the president of a county farmers' institute, approved by the director of the congressional district, the secretary of the Illinois Farmers' Institute shall draw his warrant on the treasurer of the Illinois Farmers' Institute for the said seventy-five dollars (\$75.00) and deliver it to the treasurer of the county farmers' institute: *Provided*, that the officers of said county farmers' institute shall, when issuing said order, file with the secretary of the Illinois Farmers' Institute a sworn statement which shall show that the said county institutes have held one or more duly advertised public sessions annually in accordance with such rules as are prescribed by the board of directors of the Illinois Farmers' Institute: *Provided, further*, that if the necessary expenses of a county farmers' institute shall not equal the sum of seventy-five dollars (\$75.00) as shown by receipted vouchers submitted with the aforesaid sworn statement, the said warrant shall be drawn only for the sum expended, and final report made to the Governor as provided by law.

SEC. 4. No officer or officers of a county farmers' institute shall be entitled as such officer or officers, to receive any moneyed compensation for any service rendered the same.

SEC. 5. In accordance with the provisions of section 4 of an act entitled, "An Act creating the Illinois Farmers' Institute," approved July 1, 1895, and subsequent amendments thereto, the Auditor of Public Accounts is hereby authorized and instructed to draw his warrants on the State Treasurer for the sums herein specified, in favor of the treasurer of the Illinois Farmers' Institute, and deliver the same to him upon requisition for same, signed by the president and the secretary of said Illinois Farmers' Institute, and the State Treasurer shall pay the same out of any money in the State treasury appropriated for the purposes of said act as amended.

A BILL FOR AN ACT TO ENABLE COUNTY BOARDS OF SUPERVISORS IN COUNTIES UNDER TOWNSHIP ORGANIZATION AND COUNTY COMMISSIONERS IN COUNTIES NOT UNDER TOWNSHIP ORGANIZATION, TO APPROPRIATE COUNTY FUNDS FOR USE OF COUNTY FARMERS' INSTITUTES.

(Approved June 5, 1911.)

SECTION 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly:* That it shall be lawful for county boards of supervisors in counties under township organization, and for county commissioners in counties not under township organization, to appropriate funds from the county treasury for use of county farmers' institutes in their efforts to promote the adoption of the latest approved methods of crop production, the improvement of live stock, the conservation of soil fertility, and the improvement of agricultural conditions generally: *Provided*, that in no case shall it be lawful for a county board to appropriate more than three hundred dollars (\$300) in any one year for the above purposes.

LOCAL ORGANIZATION.

WHICH PROMOTED AND CARRIED TO A SUCCESSFUL CONCLUSION
THE TWENTY-FIRST ANNUAL STATE FARMERS' INSTITUTE
MEETING.

EXECUTIVE COMMITTEE.

John L. Hufford, Oakley; Frank Gregory, Mt. Zion; A. A. Hill, Long Creek; W. A. Arnold, Milan; W. C. Chynoweth, South Macon; W. O. Matthew, Pleasant View; R. H. Coleman, Blue Mound; E. Wright Allen, Harriestown; Henry Shafer, Niantic; Elmer Birks, Illini; F. H. Morris, Austin; R. B. Wykoff, Maroa; J. F. Watkins, Hickory Point; Hugh Martin, Friends Creek; Richard Kirby, Whitmore; J. H. Hill, South Wheatland; Jack Conover, Decatur.

RECEPTION COMMITTEE.

E. C. Hollar, Austin; W. F. Bailey, Blue Mound; Hugh Martin, Friends Creek; Chas. Moffett, Decatur; Josephus Ash, Harriestown; J. F. Watkins, Hickory Point; C. H. Faith, Illini; John E. Rucker, Long Creek; John Crocker, Maroa; W. A. Arnold, Milan; Dean McGaughey, Mt. Zion; C. A. Hall, Niantic; Cassius Holcomb, Oakley; D. A. Griswold, Pleasant View; J. I. Lebo, South Macon; N. E. Stickel, South Wheatland; Richard Kirby, Whitmore; Mayor Dan Dinneen, Robt. I. Hunt, O. B. Gorin, A. M. Kenney, J. A. Meriweather, J. R. Pogue, Robert Mueller, Porter J. Millikin, W. M. Bering, H. D. Johnson, F. M. Lindsay, C. H. Leon, John Allen, Judge W. K. Whitefield, J. W. Fritz, all of Decatur.

BETTER BABIES CONTEST COMMITTEE.

Mrs. William Downey, Chairman, Decatur; Mrs. E. A. Gastman, Decatur; Mrs. W. T. Wells, Decatur; Mrs. D. A. Clough, Maroa; Mrs. A. A. Hill, Casner; Mrs. J. C. Hessler, Decatur; Dr. Harriet Day Chandler, Decatur; Dr. R. Zink Sanders, Decatur; Dr. Harry C. Kepler, Decatur; Dr. Clare Garber, Decatur; Dr. Ellen F. Grimes, Decatur; Dr. J. Huston Spyker, Decatur; Dr. H. C. Jones, Decatur.

MUSIC COMMITTEE.

E. G. Powers, Max VonLewen Swarthout, Daniel Bonus.

HOUSING COMMITTEE.

T. J. Prentice, W. H. Wiley, W. A. Hammer.

AUTO COMMITTEE.

W. C. Starr, L. F. Martin, G. W. Ehrhart.

ADVERTISING COMMITTEE.

H. C. Schaub, W. F. Hardy, W. A. Wallender.

DECATUR.

Decatur is worthy of the attention of every visitor to the Illinois Farmers' Institute in 1916.

The sixth city of Illinois in point of size, it has long been distinguished by progressiveness and aggressiveness and the willingness of its men to give their time, money and energy to public service. It is the home of advanced



DECATUR, ILLINOIS.

municipal ideas. It is a large market for the products of the farm. It is a fine example of the results of harmony and of the cooperation of the country and the city. It is central, easy to reach and hospitable. It delights in entertaining its friends and in passing on to others the benefits of its advanced experience.

A RAPID GROWTH.

Decatur has made rapid forward strides since the last State Institute was held here thirteen years ago. Its population has nearly doubled. Its industries and its trade circle have been developed and extended. Its park system has grown up. Its schools have been reconstructed and its university opened. Its business district, almost blotted out by several disastrous fires, has grown up new and greater than ever. Its dwellings have changed from structures without style to houses of distinction. Its pavements have been relaid. Its water plant has been replaced and modernized. All its old churches have been torn down to make way for handsome edifices.

All this time Decatur has been growing rapidly. In 1900 the population was 20,754. In 1910 its population was 31,140, a gain of 50 per cent. In 1915 the population was 43,000, a gain in five years of about 43 per cent. Every indication is that Decatur will continue its rapid growth. Its geographical situation, its expanding industries, its railroad facilities, its satisfactory government, its aggressive spirit, all point to a bright future.

INDUSTRIAL AND COMMERCIAL SYSTEM.

More than any other central Illinois city, Decatur is a farm market and an industrial center. Its mills grind about 12,000,000 bushels of corn a year. The principal part of this corn is ground by three mills of the American Hominy Company, the A. E. Staley Company, manufacturers of starch, and by Shellabarger Mill and Elevator Company, and by the Chapman-Doake Company, manufacturers of feed.

In addition to the grain its grinds, Decatur handles immense quantities of grain for other points on a brokerage basis. Some of the leading grain dealers of the State are Decatur men.

Milling and grain buying are, however, only a small part of Decatur's industrial and commercial system. Among the principal articles manufactured are the following: Brass lighting fixtures, brass plumbing and waterworks goods, soda fountains, bridge and structural steel, paper bags, corn shellers, grain elevator machinery, coffins and burial goods, domestic water systems and sprinkler tanks, office and bank fixtures, refrigerators, agricultural implements, bakery products, building materials, cigars, gloves and mittens, women's wear, kitchen pumps, ice and ice cream, wire mats, fly killers.

FUEL SUPPLY AMPLE.

In natural resources Decatur is fortunate. It has three coal mines of its own. Being at the north edge of the great coal fields of southern Illinois, it has a perpetual supply of cheap, efficient fuel for domestic manufacturing. It is the center of the richest agricultural territory of the county. By reason of its exceptional railroad facilities it is near the source of supply of most raw materials and is therefore able to compete with both eastern and northern points in industry. The value of its annual output of manufacturers is above \$15,000,000 and its annual industrial pay roll is in excess of \$4,500,000.

A GREAT RAILROAD CENTER.

A glance at the map shows Decatur to be the hub of a great railroad wheel. It is the central point of the Wabash Railroad, the headquarters of the Decatur division and the home of the extensive locomotive and car shops of that system. The Wabash lines out of Decatur run to Chicago and St. Louis, Detroit, to Forrest and Streator and to Altamont and Effingham. The old main line of the Illinois Central bisects Decatur. From Decatur, Illinois Central lines run to Freeport, and Madison, to Clinton, Champaign,

RESIDENCE
C. G. POWERS



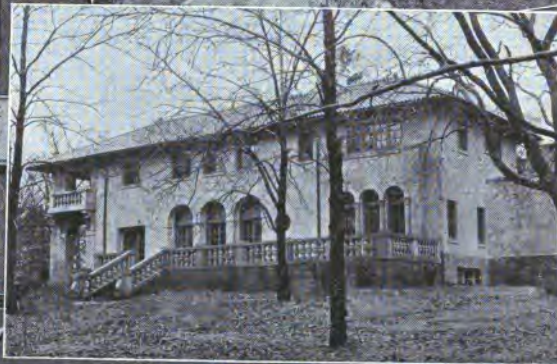
RESIDENCE
DR. E. J. BROWN



RESIDENCE
ADOLPH MUELLER



RESIDENCE
C. A. EWING



Chicago, Centralia, Cairo, Memphis and New Orleans, to Peoria and Evansville. Decatur is also headquarters of the Peoria division of the Vandalia, with a line from Peoria to Terre Haute, connecting there with the main line of the Pennsylvania Railroad. The fourth road is the Cincinnati, Indianapolis & Western, with lines to Springfield, Cincinnati and the East.

The Illinois Traction System also centers in Decatur. Trolley lines closely connect Decatur with Champaign, Danville, Bloomington, Peoria and Springfield and St. Louis and all the country between.

Decatur does not consider itself complete within itself. One of the most interesting facts about it is its relations with the farmers and the country about it. In no other section of the State are such relations so cordial. Farmers are members of the Association of Commerce. Business men offer hearty, unselfish cooperation to farmers' movements. When the city needed help to complete a magnificent new hospital it went to the farmers both in and beyond the Macon County line and secured from them gifts amounting to \$20,000. On the other hand the city has taken up the County Farm Agent movement, the oiled road movement and various other movements and pushed them with service and capital when farmers' organizations were discouraged by lack of response.

EDUCATION AND RELIGION.

Educationally Decatur is a leader. The basis of its educational system is, naturally, its fine public and parochial schools. Beyond these, however, it has the James Millikin University, a college for general and technical education; the Millikin Conservatory of Music, a school of the university; the Decatur Musical College, the Bonus Music System, several other music schools, and two first-class business colleges. These schools are all worth seeing. The university has one of the most modern and best equipped educational plants in this part of the country.

Religion in Decatur is represented by over forty churches, practically all new built within the last twelve years. Many of them are magnificent structures.

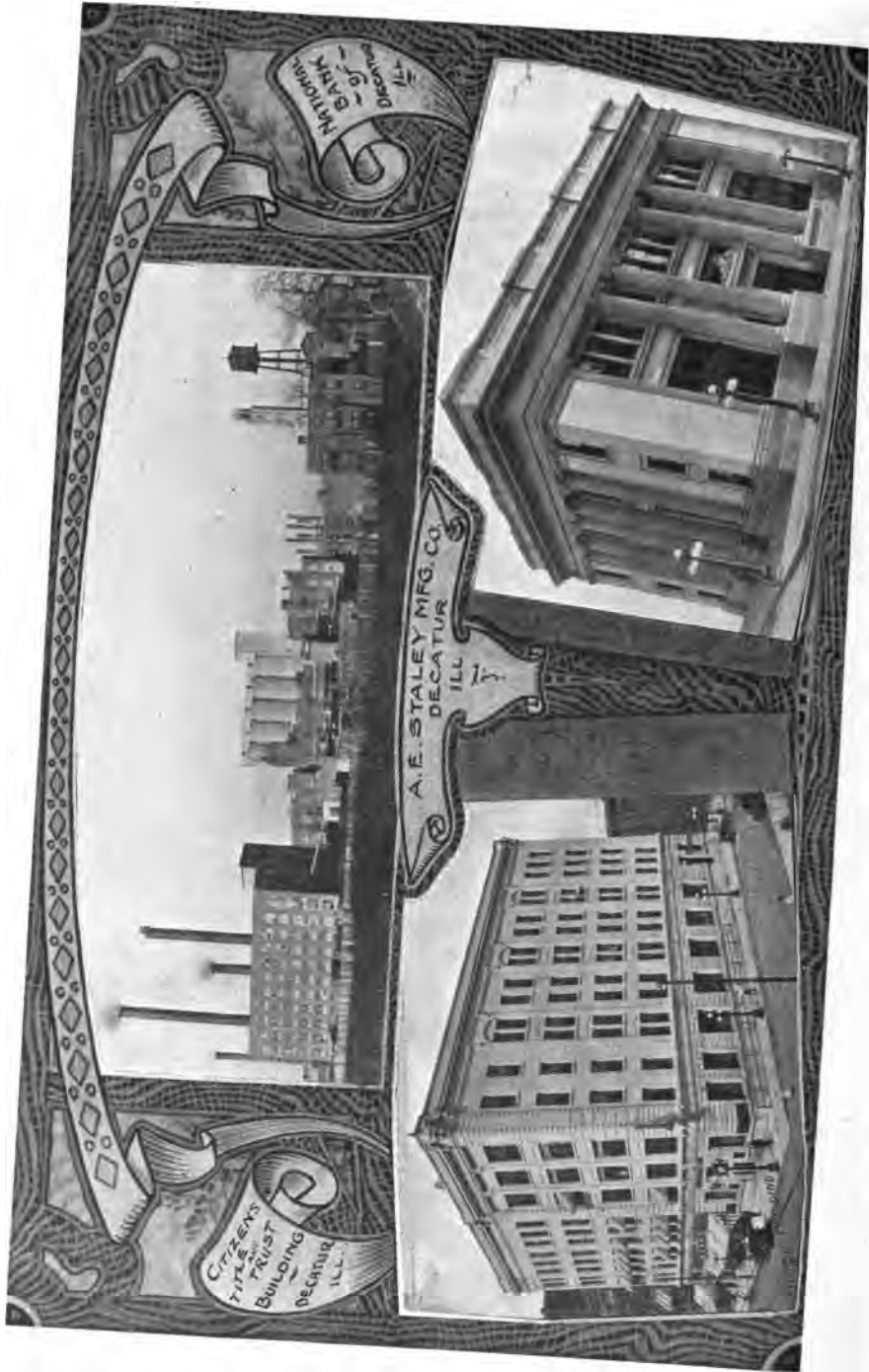
Decatur has three hospitals, the newest one, the Decatur and Macon County Hospital, which opened for patients January 1, 1916, being the last word in hospital sanitation. It is a nonsectarian, semi-public hospital, built by the people in conjunction with the county authorities. Eventually it will be increased to have 300 beds, a tuberculosis camp, a contagion building, a convalescent's building, an obstetrical building, a nurses' dormitory and the like. St. Mary's Hospital, operated by the Franciscan Sisters, is another splendid institution started nearly forty years ago and continuing its growth yearly. The Wabash Employees' Association Hospital treats only Wabash employees.

Decatur is a high class residence city. Property and rents are reasonable. There are many fine homes, some costing as much as \$75,000. So highly regarded is Decatur as a place to live that the Illinois Pythian Grand Lodge has built here its homes for orphans and aged members.

HOTELS AND AMUSEMENTS.

About 600 modern fireproof hotel rooms are now offered Decatur's guests, all at reasonable prices. Within two years the St. Nicholas Hotel and the Kraft have built fireproof additions containing 200 rooms and the Orlando has been erected with 225 fireproof rooms. No other city down-state is so well provided with hotel accommodations as Decatur.

For amusement and recreation Decatur is also well fixed. A new theater for legitimate performances is being built to take the place of the Powers Theater, burned down nearly two years ago. A vaudeville theater and several high class motion picture theaters furnish good and cheap entertainment. Musical attractions are offered in the James Millikin University and high school auditorium from time to time. The Decatur Symphony Orchestra, a volunteer organization, gives popular Sunday afternoon concerts from time to time at 10 and 20 cents.



Decatur has nearly 200 acres of parks and playgrounds and is contemplating extensive additions. It has a public library, built by Andrew Carnegie, with 40,000 volumes, in addition to school libraries.

This is the sixth year for Decatur under the commission form of government. City experts all admit that Decatur is the best and most economically governed municipality of its size in Illinois. The city government is progressive, efficient and close to the people. Four of the five commissioners are serving their second term.

Decatur has sixty miles of street pavement, of which the latest is of wood block on concrete foundation. Its principal business streets are lighted by ornamental lamps installed by special assessment and operated by the city's own electric light plant. The city owns its waterworks and street lighting system and operates them for the benefit of the public. They have been entirely rebuilt within the last seven years at a cost of over \$500,000. In spite of all these improvements, in spite of the fact that the city gets along without license money, the city taxes are comparatively low because of the efficiency of the municipal administration.

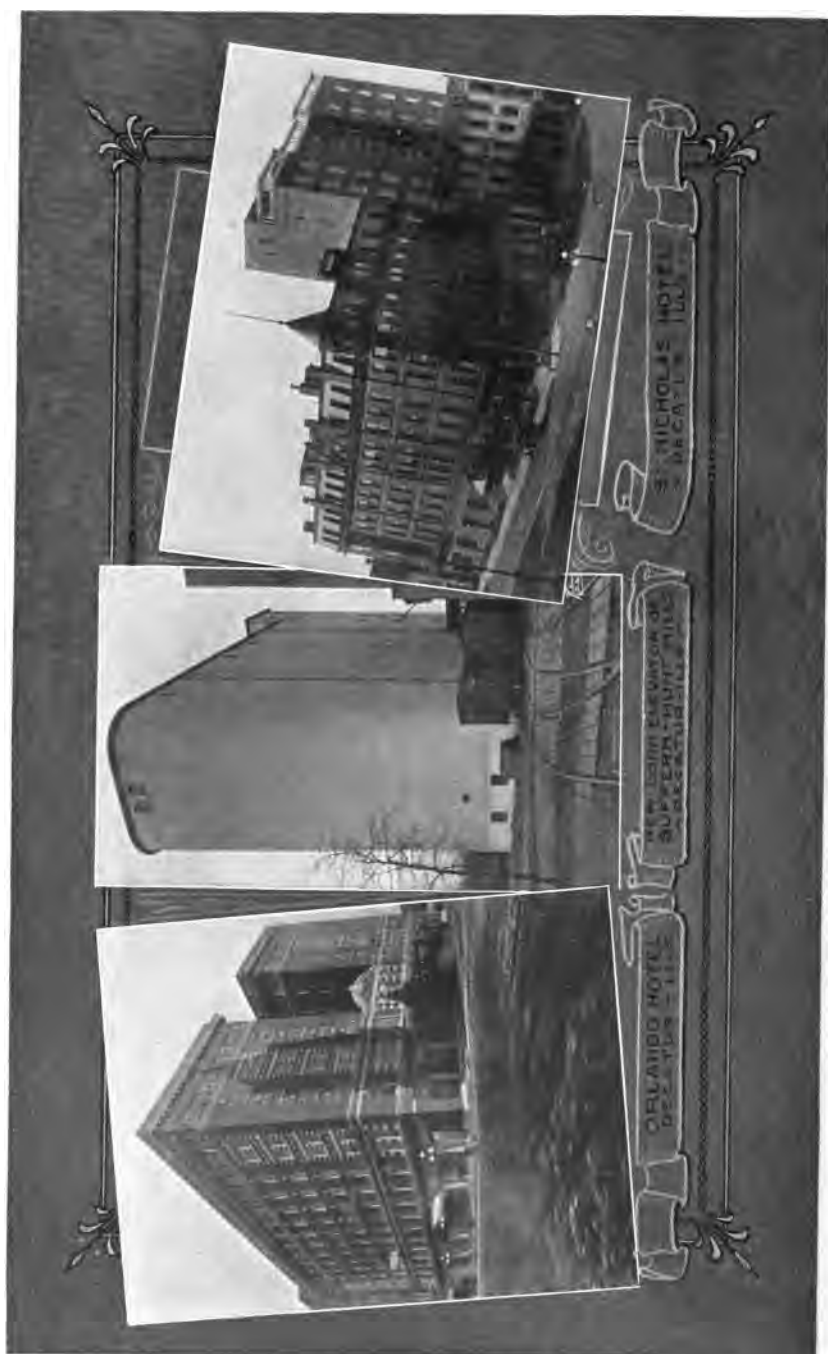
Only a look will be needed to convince the visitor of the extraordinary quality of Decatur stores. Nowhere else down-state are so many superlative stores to be found. These stores cover every line. The widening trade area of Decatur is proof that the excellence of these stores is recognized.

ASSOCIATION OF COMMERCE AND THE PRESS.

Decatur banks are strong, stalwart institutions; based on the agricultural, mercantile and manufacturing prosperity of the community. (They aggregate assets in excess of \$8,000,000.) They all own and occupy handsome buildings. The Decatur banking rooms are unexcelled.

An account of Decatur would be incomplete if it obtained no mention of the Decatur daily newspapers. The field is thoroughly covered by the Herald, morning, and the Review, evening. Much of the progress and prosperity of the city is due to the forward spirit of these papers.

The Association of Commerce is an organization of 700 individuals and firms, including business men, doctors, lawyers, farmers, and wage earners. Its object is the advancement of the community. It works in cooperation with the governmental bodies, city, township and county, and with the various organizations whose object is to promote the county's material welfare. It welcomes the farmers of Illinois to Decatur.





PROCEEDINGS OF THE TWENTY-FIRST ANNUAL STATE INSTITUTE MEETING.

The Sessions were held in the First Methodist Church and in the
Decatur High School Auditorium, Decatur, Illinois,
Tuesday, Wednesday and Thursday,
February 22, 23 and
24, 1916.

TUESDAY MORNING SESSION.

First Methodist Church, 9 o'Clock.

GEORGE F. TULLOCK, *President of the Illinois Farmers' State
Institute, Presiding.*

PRESIDENT TULLOCK. The session of the Farmers' Institute will please
come to order. We will open the session this morning with music. We will
be favored with a selection by Miss Ruth Davis, of Decatur. [Applause.]
Music, selection.....Miss Ruth Davis
Invocation.....Rev. Eugene M. Antrim

PRESIDENT TULLOCK. We will have a few words of welcome from the
mayor of Decatur, the Hon. Dan Dineen.

ADDRESS OF WELCOME.

(Hon. Dan Dineen.)

MR. CHAIRMAN, LADIES AND GENTLEMEN: It seems fitting that the repre-
sentatives of the great agricultural interests of the State should hold their
annual meeting in Decatur, the center of a district comprising the richest
farming land in the world. The people of Decatur not only deem it an
honor and pleasure to have the opportunity of entertaining you, but we feel
the importance of your work to us, because it is realized more than ever
that the prosperity of the Nation depends upon the prosperity of the farmers.
The remarkable advancement and application of scientific methods to farm-
ing in the past few years is due, in my judgment, largely to organizations
of this character, through their influence and the splendid cooperation of the
State and National governments along this line.

I believe that the prestige of this organization is due largely to the
unselfish character of its work. Its efforts are not confined to raising better
corn, better wheat, or better cattle, but you are interested in raising better
babies. You are studying and applying the principles of domestic science,
better roads, and the bringing about of that which tends to make better
living in the broadest sense.

We are glad to have you meet with us in Decatur and you will find that
the welcome of the people of Decatur is a sincere and hearty one and it will
be the effort of the officials and the people of Decatur to anticipate your every
wish during your short stay with us. We believe we have much in Decatur
that will appeal to you. We are proud of our city and its institutions and
advantages. Decatur is a clean city, morally and physically. We are proud
of our religious institutions and of our educational institutions and proud of

our manufacturing and mercantile interests. We are proud of our clean streets and pure water supply, our park system and probably our greatest asset is the Decatur spirit. That is what has made Decatur what it is to-day and that is what will in a short time put Decatur where it rightfully belongs, as the second city in Illinois, not in the matter of population, but in other important respects.

We hope that your stay will prove interesting, pleasant and profitable and that you will come again to Decatur.

I thank you. [Applause.]

PRESIDENT TULLOCK. Mr. Mayor, I am sure that it is a pleasure to me as the representative of the Farmers' Institute to express a few words of appreciation in response to the welcome you have given us here. We came to Decatur because we believed you wanted us to come and bring you something of real value. I believe that every speaker who addresses us will have a message of real worth. For 21 years the Farmers' Institute has been an active factor in building up Illinois agriculture. Those of you who have followed the work will see much that has been accomplished. The work is not done, by any means. From year to year the scope of the work is widening and I predict that the Farmers' Institute will continue to be a power in Illinois agriculture for many years to come. We will go away from this meeting fortified with the knowledge we have obtained and we will be better citizens and farmers than we have been before.

We thank you for your cordial welcome, Mr. Mayor. [Applause.]

PRESIDENT TULLOCK. I will now introduce to you Mr. John L. Hufford, chairman of the Macon County Farmers' Institute, who has a few words to say to us this morning.

Mr. HUFFORD. MR. CHAIRMAN AND GENTLEMEN: Mr. Dineen welcomed you to the beautiful city of Decatur and I welcome you to Macon County. If it were not for Macon County, Decatur would not be here. That is why we welcome you to Macon County. [Applause.]

PRESIDENT TULLOCK. A few years ago I attended a farmers' institute at Paris, Ill., and at the evening meal in the hotel I had the pleasure of being seated at the table with three gentlemen who had been following institute work for years. They had been building monuments that will never perish.

It was my pleasure last year to visit at "Woodlawn Farm" in Ohio, the home of one of those gentlemen, just ten days before he passed from this earth, and I feel sure that there are many people in these United States who when they go out to view their beautiful alfalfa fields, will pause and think kindly of Joseph E. Wing.

The second gentlemen at that table also builded great monuments on this earth. He, too, builded monuments with the alfalfa plant. He also builded monuments with the silo, and I am appalled at the size of the monument when I think of all the silos that were builded in these United States through the influence of the teachings of this man. There are many people in these United States, who, when they look over their alfalfa fields and silos, will think kindly of our past president, Hon. A. P. Grout.

There was another man at that table. He has also been building monuments, but his have been along the line of soil experimentation with the object of properly maintaining the fertility of the soil that it may produce more and more and at the same time become richer. Whenever this man's monument perishes, the monuments of the other gentlemen will have passed away.

We hear a good deal about preparedness these days. This gentleman has been preaching that for years—the preparedness that tends to produce instead of reduce. There are many people in these United States who, when they go out to view their growing crops, and also when they go out to harvest those growing crops, people who have followed the teachings of this man, will think kindly of Dr. Cyril G. Hopkins, and it affords me the greatest of pleasure to be able to introduce to you Dr. Cyril G. Hopkins, chief of the Agronomy Department of the University of Illinois, who will speak to you on "Phosphates and Honesty." [Applause.]

PHOSPHATES AND HONESTY.

(Dr. Cyril G. Hopkins.)

Dr. HOPKINS. MR. CHAIRMAN, LADIES AND GENTLEMEN: I surely, deeply, appreciate these very kind words of welcome and commendation. I feel like offering an apology to you for the length of my paper, as I have prepared a paper to read to you this morning. I think perhaps I should state that Mr. McKeene told me that Prof. Roberts cannot be with us this morning and I may take some extra time. The time is to be divided between Brother Leo and myself.

At the end of the year, a wily Negro preacher said to his unsuspecting congregation: "Brethe'n, de time am come fo' de 'lection of a pastah fo' dis chu'ch fo' anothah yeah. All those in favah of me, please say aye."

To this invitation, not a voice responded, whereupon the preacher spoke as follows: "My beloved brethe'n, I can't spress my 'preciation. I is myself ovahwhelmed, and I know you is too full fo' uttahance, but, of cou'se, silence always gives consent, and I's moah than pleased to announce that I is 'lected youh pastah fo' anothah yeah."

I am to discuss with you the subject of phosphates: First, because the importance of the subject justifies careful consideration; second, because I am able to present some valuable information from the investigations of many states; third, because I wish to bring to your attention the adverse opinions of some others concerning raw phosphate, and also to prevent the conclusion on their part that our silence gives consent to their statements.

A FARMER'S QUESTION.

A Pennsylvania farmer sent the following very intelligent question to the *Rural New-Yorker*:

"Recently I have been reading a good deal on soil fertility for the purpose of ascertaining the consensus of opinion of expert farmers, experiment stations, agricultural colleges, etc., as to the benefit to be derived from the use of ground rock phosphate on soils. I had about arrived at the conclusion that raw rock phosphate, when applied to manure in the stable or compost heap, and thoroughly incorporated therewith so as to effect an even distribution on the land, or if applied to a good growth of clover or other green crop and turned under, would prove highly beneficial. I now read, on page 1321 [*Rural New-Yorker*], that 'a recent bulletin from the Massachusetts Experiment Station shows clearly that during a long series of years the rock phosphate gave little if any benefit.' Are these differences of opinion due to the differences in the humus content or other conditions of the soils experimented with?"

In answer to this inquiry, on the first page of the *Rural New-Yorker* for December 11, 1915, occurs the following editorial statement:

"A group of men connected with the Illinois Experiment Station are chiefly responsible for the theory that the ground rock phosphate is most profitable. Their argument is plausible at least—that the chemical action in manure or in decaying organic matter will make this rock phosphate more or less available, thus saving the cost of using the expensive sulfuric acid. These rock phosphate men appear to think that anyone who fails to agree with them must be in some way influenced by dishonest motives. The *Rural New-Yorker* would be only too glad to tell its readers that they might save the cost of chemicals in preparing phosphoric acid, but if we consider the facts we cannot honestly do this. Every experiment station in the Atlantic coast states has found that, for the soil and crops in this section, acid phosphate on the whole is more profitable than the ground rock."

In further reply to this inquiry the *Rural New-Yorker* says:

"The latest bulletin on this subject is No. 162, from the Massachusetts Experiment Station at Amherst. This gives, in detail, the results of eighteen years' work in testing different forms of phosphates. It would be difficult to imagine a more thoro test than this one conducted by Prof. Wm. P. Brooks. The conclusions reached are stated in the following definite manner:

"No injurious secondary effects are known to be associated with any reasonable use of dissolved phosphates. Our experiments indicate that they do not increase the necessity for the use of lime.

"Massachusetts farmers, gardeners, and orchardists are advised against the general use of raw rock phosphates. In so far as they are needed in our agriculture the phosphates employed should be the more soluble and available kinds, such as acid phosphate, dissolved bone, basic slag meal, and bone meals. The dissolved forms are advised for a quick start and early maturity.

"Natural rock phosphates are unadapted to the conditions of our agriculture, and their use will, with most of our crops and on most soils, give highly unsatisfactory results. What is needed in our agriculture is frequent applications of dissolved or quickly available phosphates."

Continuing, the *Rural New-Yorker* says:

"There is no possible way of misunderstanding that. A full study of this bulletin will interest any farmer who uses fertilizer. Dr. Brooks shows clearly that the essential need of New England soils is potash. * * * The Massachusetts experiments show that the acid phosphates stimulate an early root and top development and an early and perfect ripening. They also help to increase the availability of potash, promote nitrification and increase the gain of nitrogen from the air. * * * Sulfuric acid has gone much higher in price since spring. * * * This will make acid phosphate higher than ever, and if it were possible to substitute the raw phosphate for growing crops on our eastern soils, we should certainly advise its use. The weight of both scientific results and practical experience is in favor of using annual applications of soluble phosphates."

These quotations fairly represent the conclusions drawn by Dr. Brooks in the recent Massachusetts bulletin, as well as the comments by the editor of the *Rural New-Yorker*, which, however, do not answer fairly the questions asked by the Pennsylvania farmer.

This farmer does not even mention Illinois, but he refers to "the consensus of opinion of expert farmers, experiment stations, agricultural colleges, etc.," and he plainly shows that he has an intelligent opinion of the proper way to use rock phosphate. He then asks if the difference between the conclusion he "had about arrived at" and the conclusions of Dr. Brooks was possibly "due to the differences in the humus content or other conditions of the soils experimented with."

On page 148 of the Massachusetts bulletin, Dr. Brooks makes the following statement in regard to the soil used in the experiments continued for eighteen years:

"The soil varies somewhat in physical character, but as the variation is progressive from one end of the field to the other, and the arrangement includes a no-phosphate plot at either end and one in the middle, each phosphate being compared only with the two no-phosphate plots between which it lies, and each of these being given a weight inversely proportional to its distance, it is not believed that any injustice is done to any of the phosphates in the results as presented. The more soluble phosphate plots are at the end of the field where the soil is the more heavy."

Our Illinois experiments have shown that phosphorus, even as bone meal, produces little or no benefit on the lighter, more porous sandy soils, while marked benefit may be produced on heavier and more compact soils. One cannot be certain as to the character of the lighter soil on this Massachusetts field. Thus, on page 190 of the Massachusetts report for 1896 occur the following statements concerning one of the two fields used in the phosphate experiments:

"Previous to 1887 it was used as a meadow, which was well worn out at the time, yielding but a scanty crop of English hay. During the autumn of 1887 the sod was turned under and left in that state over winter. It was decided to prepare the field for special experiments with phosphates by systematic exhaustion of its inherent resources of plant food. For this reason no manurial matter of any description was applied during the years

1887, 1888, and 1889. The soil, a fair sandy loam, was carefully prepared every year by plowing during the fall and in the spring to improve its mechanical condition; during the same period a crop was raised every year."

But on page 147 of Massachusetts Bulletin 162, Dr. Brooks makes the following statement concerning his tests with phosphates:

"Two series of experiments in this station throw light upon the question. Both have been carried out on medium silt loams containing an average per cent of humus and possessing excellent physical characteristics."

Question: If a medium silt loam is a fair sandy loam, then what is the lighter phase of the silt loam?

Dr. Brooks' bulletin also shows that before his experiments were started the check plot on the lighter soil produced 3,440 pounds of corn ("gross weight") per acre, while the check plot on "the more heavy" soil produced only 2,640 pounds, but that 3,555 pounds were produced on another plot later treated with a soluble phosphate. As an average, these previous tests show that in comparison with the respective check plots, the plots which later received available phosphate were 15 per cent more productive than those which received raw phosphate, according to the method now used by Dr. Brooks for computing increases in crop yields, a method which he has recently and perhaps wisely adopted after having used for eighteen years a different method of computing increases.

It should also be noted that the plan of this Massachusetts experiment was to compare equal amounts of phosphorus—which under normal conditions in Illinois means about \$4 worth of soluble or available phosphate as compared with \$1 worth of raw phosphate, while, under the present high prices mentioned by the *Rural New-Yorker*, it means \$1 worth of raw phosphate as compared with \$5 or \$6 worth of acid phosphate.

A dozen pages of the bulletin are devoted to this eighteen-year experiment, while less than one page is devoted to another Massachusetts experiment in which different phosphates were compared, in equal money values, over a period of twelve years and then discontinued. This page seems to have been entirely overlooked by the *Rural New-Yorker*. Regarding this experiment Dr. Brooks makes the following statement on page 148 of his new bulletin.

"The experiment was continued twelve years. During this long period of time the basic slag meal gave the greatest total crop yield; the South Carolina rock phosphate ranked next, but was followed so closely by the dissolved bone black that the difference was quite insignificant in spite of the fact that the latter was used in a manner so absolutely irrational, and applied in quantity furnishing only about one-third as much phosphorus¹ as was applied in the South Carolina rock phosphate."

In Illinois, substantial and permanent soil enrichment is encouraged, but on the same page Dr. Brooks states, as tho it were highly objectionable, that, at the end of the twelve years—

"There still remained in the soil of the plots which had received the rock phosphates more than two-thirds of the large amount of phosphorus which had been applied. At the same time, the phosphorus which had been applied in the dissolved bone black had nearly all been carried away in the crops."

Nevertheless he seems to feel that it is "absolutely irrational" not to apply acid phosphate annually or frequently. In his eighteen-year experiments (1897 to 1914) the applications were annual and were based on 500 pounds per acre of acid phosphate. Thus he compared 404 pounds of raw bone meal, 522 pounds of dissolved bone black, and 538 pounds of basic slag phosphate, with only 296 pounds of Tennessee raw rock phosphate.

I must state that Dr. Brooks' bulletin purports to be a study of the Illinois system of permanent fertility, but he incorrectly assumes that we have advised the use of raw phosphate for market gardening, or even for general farming under the recent conditions of Massachusetts agriculture, which are indicated by the following statement taken from the latest report

¹ The word "phosphorus" is substituted for phosphoric acid here and in the following quotations in this circular.—C. G. H.

of the United States Bureau of Census in regard to the farm land of Massachusetts:

"The area of improved land decreased without interruption until in 1910 it was only about one-half what it was in 1880."

Dr. Brooks says (page 147):

Since, however, without doubt some phosphorus should be applied in our ordinary farm and garden practice, the question whether, as Hopkins and his disciples believe, fine-ground rock phosphate is the best form, is important."

A Pennsylvania farmer seems to have been a more careful student, or "disciple," than Dr. Brooks, in regard to the Illinois system. This stranger wrote me as follows under date of November 5, 1915:

"Last winter at a farmers' institute in my township Mr. ——— quietly gave me the laugh for using raw phosphate. I asked him if he had used any and he said 'Yes.' I then said, 'But, how?' And then he replied that he had drilled it on when sowing wheat. I changed the subject, for I never saw a word printed anywhere that would permit putting it on bare ground."

On page 149 of his bulletin, Dr. Brooks says:

"All fertilizers have been applied broadcast in the early spring, and, except when the land was in grass, on the plowed surface¹ and disked in."

In the eighteen years covered by the experiments in which Dr. Brooks compares \$1 worth of raw phosphate on the lighter soil with several dollars' worth of available phosphates on the heavier soil, he harvested and removed nineteen crops (including two crops in 1900 and two in 1911). He used no farm manure and plowed under no legume crops and no straw or corn stalks; but he states that "wishing, however, to create conditions as favorable as possible to the action of the raw phosphates," he plowed under during the eighteen years two cover crops of rye and one crop of buckwheat. Those three spasmodic efforts, one during the first fifteen years (in 1901), and the others in 1912 and 1913, would be regarded as a joke by a real student of the Illinois system, which requires that the nitrogen for all non-legume crops shall be provided by plowing under home-grown nitrogenous organic matter, in farm manure, legume crops, and crop residues.

While the Illinois Agricultural College and Experiment Station, the Illinois Farmers' Institute, the agricultural press, and many of the progressive and successful farmers of Illinois and other states, are jointly responsible for evolving and advocating the Illinois system of permanent fertility, the *Rural New-Yorker* is in error in the statement that "a group of men connected with the Illinois Experiment Station are chiefly responsible for the theory that the ground rock phosphate is most profitable," and also in error in the assertion that "every experiment station in the Atlantic coast states has found that, for the soil and crops in this section, acid phosphate on the whole is more profitable than the ground rock."

MASSACHUSETTS TWELVE-YEAR EXPERIMENTS.

In the report of the Massachusetts Agricultural Experiment Station for 1900, before the first ton of raw phosphate was applied to Illinois soil, Dr. Wm. P. Brooks made the following statement concerning the Massachusetts experiments which were discontinued about that time, after twelve years' results had been secured:

"Taking into account all of the crops which have been grown upon this field, except the Swedish turnips (rutabaga), which were affected by disease not apparently due to the fertilizer which had been used on a portion of the plots, and the yields of which, therefore, as expressed in figures, would be misleading, and representing the aggregate yield which stands highest, by 100, the efficiency of the different phosphates is as follows:

Phosphate slag	100.0	Dissolved bone black	90.7
Ground South Carolina rock ..	92.3	Mona guano	88.3

"There was at first no no-phosphate plot used in the experiment, but we have had a no-phosphate plot since 1895. Taking into account the yields

¹ Recent Ohio experiments have shown that raw phosphate applied to the surface after plowing under manure produces much less effect than when plowed under with the manure.—C. G. H.

of the several plots since 1895, and excepting the Swedish turnips, which were grown in 1897, for reasons above stated, the phosphates have the following relative rank:

South Carolina rock phosphate	100.0	Mona guano	95.4
Phosphatic slag	99.0	No phosphate	55.4
Dissolved bone black	97.7		

"The following conclusions appear to be justified by the results which we have obtained:

"It is possible to produce profitable crops of most kinds by liberal use of natural phosphates, and in a long series of years there might be a considerable money saving in depending, at least in part, upon these rather than upon the higher priced dissolved phosphates."

RHODE ISLAND TWENTY-YEAR EXPERIMENTS.

Dr. H. J. Wheeler, while director of the Rhode Island Experiment Station, and before accepting his present position as a fertilizer expert with the American Agricultural Chemical Company, made the following statement in Bulletin 114, concerning Rhode Island phosphate experiments covering many years:

"With the pea, oat, summer squash, Japanese millet (on the unlimed land), golden millet, white-podded Adzuki bean, soybean, and potato (on the unlimed land), floats [raw phosphates] gave very good results, but with the flat turnip, table beet and cabbage they were relatively very inefficient."

It will be noted that with general farm crops the results were good, while the garden crops seemed not so able to utilize the raw phosphate. Largely in consequence of these experiments, the use of raw phosphates for market garden crops has been thought inadvisable, altho Dr. Brooks' results with cabbage suggest that at present prices for phosphates even gardeners may well consider the liberal use of raw rock. Three years later Dr. Wheeler wrote as follows in Rhode Island Bulletin 118:

"Floats [raw phosphates] gave very good results with the soybeans, peas, crimson clover, mangel-wurzel (on limed land), barley (on limed land), potato (on unlimed land), Japanese millet, oats and golden millet; but they proved highly inefficient, especially for Hubbard squash, rutabaga, crook neck squash, flat turnip, cabbage, mangel-wurzel (on the acid unlimed land), tomato, lettuce, New Zealand spinach, and red valentine bean."

If we add together all of the grain and hay produced during the decade following the first year, these Rhode Island experiments show the following yields per acre for eight crops:

With no lime or phosphate, 8,310 pounds.	With lime and raw phosphate, 35,340 pounds.
With raw phosphate, 22,890 pounds.	With lime and acid phosphate, 37,000 pounds.
With acid phosphate, 22,860 pounds.	

The total applications per acre were 2.4 tons of acid phosphate and only 1.4 tons of raw rock phosphate.

Since the above was written, I have received a copy of Bulletin 163 of the Rhode Island Experiment Station, reporting further results from these investigations. On page 547 of this later bulletin the record of twenty years is reported, showing that for each dollar paid for phosphorus used on limed land the acid phosphate paid back \$15.56 and the rock phosphate paid back \$17.36; while on unlimed land the corresponding returns were \$14.07 for acid phosphate and \$23.15 for rock phosphate. (See accompanying table.)

Of course, the Rhode Island prices for produce, such as \$16 a ton for hay, \$20 for cabbage and squash, 85 cents a bushel for corn, etc., are much higher than in Illinois, but the comparative results would be still more in favor of rock phosphate with Illinois prices for these fertilizers, which under normal conditions are not more than \$7 a ton for raw phosphate and not less than \$15 for acid phosphate, while the prices used by the Rhode Island Station are \$11 for raw phosphate and only \$13 for acid phosphate.

RHODE ISLAND PHOSPHATE EXPERIMENTS.

Table XXI—Relative Crop Values for an Equal Cost and Amount of Phosphoric Acid Applied, 1894-1913.

	Amount of phosphates applied, 1-10 acre—lbs.	Cost of phosphates at present prices, 1-10 acre.	Value of crops 1-10 acre.		Increase per \$1 paid for phosphoric acid.		Increase in crop value due to 73.86 lbs. phosphoric acid, 1-10 acre.	
			Limed.	Un-limed.	Limed.	Un-limed.	Limed.	Un-limed.
Dissolve bone black.....	424.3	\$3.18	\$129.91	\$80.48	\$16.34	\$13.22	\$51.95	\$42.04
Dissolved bone.....	458.9	3.21	131.77	85.27	16.76	14.58	53.81	46.83
Dissolved phosphate rock.....	482.1	3.13	126.65	82.49	15.56	14.07	48.69	44.05
Fine-ground bone.....	282.6	2.68	128.78	95.71	18.96	21.37	50.80	57.27
Thomas slag phosphate.....	419.9	2.94	128.81	99.70	17.30	20.84	50.85	61.26
Raw phosphate rock.....	280.9	1.55	104.87	74.32	17.36	23.15	26.91	35.88
Raw Redonda phosphate.....	204.0	1.53	72.05	46.33	(-)-3.86	5.16	(-)-5.91	7.89
Roasted Redonda phosphate.....	156.6	2.58	110.80	52.26	12.73	5.36	32.84	13.82
No phosphate.....			77.96	38.44				
Double superphosphate ¹	166.4	3.06	119.33	60.34	13.43	7.11	41.37	21.90

¹ This phosphate not having been included until the second year of the experiment is credited here with the average crop of corn produced the first year on the other acidulated phosphate plats.

NOTE.—This tabular statement is taken entirely from page 547 of Rhode Island Bulletin 163. The Redonda phosphate is not ordinary "phosphate of lime," but a phosphate of iron and aluminum, the fertilizing value of which is not well established.—C. G. H.

The original plan of these experiments made by Director Flagg was to apply the phosphates in equal money values, but this was changed by Director Wheeler to equal amounts of phosphorus. At the Rhode Island prices the rock phosphate applied cost only 50 per cent as much as the acid phosphate (at Illinois prices, only 27 per cent as much). In summarizing the results of twenty years, the authors of Bulletin 163 (Director Burt L. Hartwell and S. C. Damon) make the following statement on page 549:

"Raw phosphate rock increased the crop values \$27 and \$36, respectively, on the limed and unlimed plots, or 56 and 82 per cent, respectively, of the increase caused by the dissolved phosphate, or acid phosphate."

According to this record of twenty years, one ton of raw phosphate containing 280 pounds of phosphorus is worth at least as much as one ton of acid phosphate containing 140 pounds of phosphorus.

MAINE PHOSPHATE EXPERIMENTS.

The Maine Experiment Station reported four years' results from an experiment in which raw phosphate and acid phosphate were used in equal money values, and in his report upon those experiments in 1894, Dr. W. H. Jordan, then director of the Maine Station, now of the New York Station, made the following statement:

"With the exception of the oat crop of 1891 the production of plot two [with raw phosphate] has largely exceeded that of plot three [with acid phosphate.] Especially is this true of the 1894 crop after the exhausting effect of three years of cropping. * * * This is certainly one instance of the unmistakable persistent influence of a crude phosphate in increasing the growth of a field crop."

In another Maine experiment, where equal amounts of phosphorus were applied in bone meal, acid phosphate, and raw phosphate, the raw phosphate, costing one-third as much, produced more than half as much increase as the average of the high-priced forms.

PENNSYLVANIA TWELVE-YEAR EXPERIMENTS.

The Pennsylvania Experiment Station has reported the results of experiments which extended over twelve years, from 1884 to 1895, and were then discontinued. On page 210 of the Pennsylvania report for 1895 we find the following summary:

"The yearly average for the twelve years gives us a gain per year of \$2.83 from insoluble phosphorus (ground bone), \$2.45 from insoluble phosphorus (South Carolina rock), \$1.61 from reverted phosphorus, and 48 cents from soluble phosphorus, thus giving us considerably better results from the two forms of insoluble phosphorus than from the reverted or soluble forms, thus indicating that the insoluble phosphorus is of more value as a manure than is often supposed, and that it is worthy of more attention than has been given to it in the past."

MARYLAND TWELVE-YEAR EXPERIMENTS.

The Maryland Experiment Station conducted field investigations with different phosphates over a period of twelve years, from 1895 to 1906, after which the investigations were discontinued. In summarizing the results of these investigations, Dr. H. J. Patterson, director of the Maryland Station, made the following statements:

"The results obtained with the insoluble phosphates has cost usually less than one-half as much as that with the soluble phosphates.

"The results show decidedly that plants are able to utilize insoluble rock phosphate.

"The use of an abundance of organic matter in the soil when insoluble phosphates are applied was evidently a necessity for their best effects.

"Insoluble South Carolina phosphate rock produced a higher total average yield than dissolved South Carolina rock."

TEACHINGS AND RESPONSIBILITY.

In a general review of the world's investigations with different phosphates, published in 1902 as Bulletin 94 of the Pennsylvania Department of Agriculture, Dr. Patterson, then director and chemist of the Maryland Agricultural Experiment Station, and now also president of the Maryland Agricultural College, made the following significant statements:

"The experiments, which have been quoted from, show that many of the popular notions regarding phosphates are not fully warranted and that much of our daily practice is either based upon preconceived ideas or been moulded by such information as has been given out which would serve the interest of fertilizer manufacturers. * * * Much of the practice now followed in the use of phosphates is not founded upon facts; but probably backed either by the tradition and statements gathered from the customs of our forefathers or promulgated by the teachings of the commercial world. The latter, in many cases, are much colored for the sake of self-preservation and financial gain.

"There is no doubt but that the first step in the economical use of phosphates is to imitate nature and endeavor to keep the soil well supplied with organic matter; for it is only by such means that the phosphates contained in the soil naturally and those applied artificially can be fully utilized by the cultivated crops."

The men who are "chiefly responsible for the theory that the ground rock phosphate is most profitable" are Director Wm. P. Brooks of Massachusetts, Director H. J. Patterson of Maryland, and other directors of experiment stations in the northern Atlantic coast states, and their theory is based upon the facts established by their own investigations. In Illinois we have accepted these facts with confidence in the honesty of those public servants and public-service institutions, and the thought of dishonesty mentioned by the *Rural New-Yorker* should not be credited to Illinois people.

OHIO EIGHTEEN-YEAR EXPERIMENTS.

I have given the general, or average, results of the phosphate experiment of the eastern states, chiefly in exact figures and direct quotations; but probably the most important series of experiments with raw phosphate and acid phosphate are those conducted by the Ohio Experiment Station. Thru the kindness of Director Thorne, I was able to present to the annual meeting of the Illinois Farmers' Institute in 1915 averages of all results secured including the 1914 crops, and for this information I beg to refer you to the report of that meeting or to Circular 181 of the Illinois Experiment Station.

SECONDARY EFFECTS OF ACID PHOSPHATE.

In Rhode Island Bulletin 114, Dr. Wheeler made the following statement: "The use of fine-ground bone, basic slag meal, and floats [raw phosphate] has tended continually to make the unlimed land more favorable to clover, as is well shown by its appearance only upon those plots of the unlimed series where these phosphates had been used, while it was absolutely lacking where * * * the soluble phosphates had been applied."

In the *Ohio Farmer* for January 2, 1904, Director Charles E. Thorne of Ohio made the following statements:

"In 1900 half of one section of the five-year rotation at Wooster * * * was dressed with lime, applied across the plots at the rate of 2,000 pounds per acre. Following the regular course of the rotation, this section was sown to timothy and clover in the fall of 1901 and spring of 1902, with the result that when the crop had reached the spring of 1903 the limed ends of all the fertilized plots showed an even and full stand of clover, while on the unlimed ends there was practically no clover on the plots dressed with acid phosphate alone, or with that and potash only, and a very irregular stand where carriers of nitrogen had been added to the [acid] phosphate. Where bone meal or basic slag had been used the clover stand, tho not perfect, was very decidedly better than where acid phosphate or dissolved bone black had been used.

"At harvest time the wheat was removed from another section of this test, half of which had been similarly limed, for the corn crop of 1901, and the clover here repeated almost identically the appearance shown on the section just described, so that we can no longer doubt that on the soil of this farm, and this soil is typical of a large area, the use of acidulated fertilizers is injurious to the clover crop."

These quotations are here recorded because of the statement made by Dr. Brooks, and emphasized by the *Rural New-Yorker* as impossible of misunderstanding, to the effect that "no injurious secondary effects are known to be associated with the use of dissolved phosphates."

One ton of rock phosphate costing about \$7 delivered in Illinois, when mixed with about one ton of sulfuric acid, makes about two tons of acid phosphate now costing more than \$35 in car lots; and, aside from that which reacts upon the impurities present, the acid phosphate contains the full acidity equivalent of the sulfuric acid used. While the acidity of acid phosphate is a minor objection to its use, for it can be easily corrected by the use of more ground limestone, to teach that acid phosphate does not increase soil acidity is undeniably erroneous, as anyone may easily determine for himself by testing acid phosphate for acidity.

It has been implied by Dr. Brooks that the manufactured land-plaster contained in acid phosphate may act as a soil stimulant, and this suggestion seems to be supported by the results of the twenty years' experiments in Rhode Island. In those experiments one of the soluble phosphates applied was double superphosphate, which does not contain the land-plaster (calcium sulfate), altho the phosphorus compound is the same as in common acid phosphate. On page 547 of Rhode Island Bulletin 163, it is shown that the average acre-value of the crops grown was \$29.10 with no phosphate, \$44.80 with raw rock phosphate, and \$44.92 with double superphosphate costing twice as much as the rock phosphate at Rhode Island prices or four times as much at Illinois prices. But with common soluble phosphates the average acre-value of crops was much higher, as shown in the tabular statement.

I think no other field experiments have been conducted in this country with double superphosphate, and these data are too meager for final conclusions, but they raise the question whether, in case one desires to use land-plaster as a soil stimulant, he may not better buy it for \$6 or \$8 a ton in ground natural gypsum rock rather than at a cost of \$20 or \$25 in manufactured acid phosphate.

MASSACHUSETTS EXPERIMENTS WITH EQUAL AMOUNTS OF PHOSPHORUS: YIELDS PER ACRE.

Plot No.	1	2	3	4	5	6	7	8	9	10	11	12	13
1896 Corn crop, tons.....	1.72	1.54	1.50	1.55	1.58	1.51	1.42	1.45	1.44	1.78	1.46	1.50	1.32
Yearly application per acre, lbs.													
1897 Ear corn, bu.....	64.6	376	376	364	538	298	.....	522	404	432	380	500	.....
1897 Corn stover, tons.....	2.32	1.90	2.14	2.48	70.9	77.5	73.5	70.7	76.9	72.4	57.5	71.8	76.9
1898 Cabbage, tons.....	35.95	25.04	24.42	23.06	23.70	22.54	31.22	21.46	24.75	21.58	18.42	21.22	18.22
1899 Ear corn, bu.....	85.6	82.0	80.1	82.1	81.6	80.3	81.1	87.9	83.6	81.1	69.5	68.5	67.2
1899 Corn stover, tons.....	2.68	2.76	2.64	2.80	2.86	2.82	2.72	2.80	2.96	2.06	2.00	2.36	2.60
1900 Oat hay, tons.....	2.90	2.94	2.90	2.78	3.36	2.82	2.56	3.40	3.14	2.88	2.68	2.78	1.96
1900 Millet hay, tons.....	1.90	2.00	2.00	2.10	1.92	1.98	1.98	1.84	1.90	1.74	1.72	1.92	1.94
1901 Onions, bu.....	279	222	235	151	252	206	141	210	252	213	188	188	123
1901 Scallions, tons.....	.64	.92	.90	1.14	.58	.86	1.00	.30	.32	.30	.28	.46	.90
1902 Onions, bu.....	196	102	122	52	252	45	51	174	301	389	244	159	26
1902 Scallions, tons.....	4.28	4.24	4.68	3.44	2.80	3.48	2.68	2.82	2.07	2.70	2.92	3.26	3.30
1903 Cabbage, hard, tons.....	2.02	1.78	6.02	1.92	4.96	.86	.20	4.20	5.90	6.38	4.36	3.10	.22
1903 Cabbage, soft, etc., tons.....	4.68	8.68	12.24	10.92	14.02	14.58	7.06	15.76	16.22	14.66	14.10	12.06	4.04
1904 Ensilage corn, tons.....	20.50	20.36	20.25	14.12	18.22	16.06	16.17	15.04	22.90	20.92	14.20	14.52	10.12
1905 Hay, 2 crops, not weighed.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1906 Hay, tons.....	4.20	4.62	4.53	4.55	4.60	4.37	4.60	4.60	4.56	5.04	4.69	4.70	4.08
1907 Hay, tons.....	4.40	4.65	4.49	4.44	4.39	4.18	4.20	4.84	4.87	4.83	4.44	4.32	3.80
1908 Cabbage, tons.....	1.90	2.24	5.72	5.36	9.56	2.80	1.04	10.04	10.12	1.16	6.72	4.14	.92
1908 Soy beans, bu.....	31.0	30.1	31.3	31.7	31.2	31.2	29.5	28.5	32.0	32.9	33.9	32.8	25.8
1909 Soy beans straw, tons.....	1.61	1.59	1.69	1.56	1.63	1.31	1.14	1.48	1.45	1.45	1.34	1.28	.89
1910 Potatoes, bu.....	286	289	286	235	246	236	244	248	259	264	262	257	215
1911 Oat hay, tons.....	2.00	2.14	1.96	2.02	2.28	2.04	2.00	2.54	2.80	2.54	2.52	2.00	1.16
1911 Alfalfa hay, tons.....	.50	.56	.42	.44	.46	.36	.28	.32	.46	.40	.58	.56	.50
1912 Buckwheat, turned.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1913 Ear corn, bu.....	59.2	55.2	52.8	52.8	57.0	50.7	46.7	47.3	48.2	52.3	50.2	42.7	29.2
1913 Corn stover, tons.....	2.18	2.30	2.54	2.54	2.55	2.54	2.18	2.48	2.64	2.46	2.56	2.54	1.82
1914 Ear corn, bu.....	79.6	74.8	80.5	75.6	76.8	78.0	74.8	84.2	85.6	77.3	80.5	74.6	51.9
1914 Corn stover, tons.....	3.36	3.56	3.44	3.46	4.32	3.32	3.28	3.62	3.70	3.64	3.46	3.12	2.18

¹ Apatite used in 1897-1905; Arkansas phosphate since 1908.

² Navassa phosphate used in 1897-1900; Tennessee since 1901.

³ Applied 380 pounds yearly 1901-1913, and 1,940 pounds in 1914.

DETAILS FROM MASSACHUSETTS.

Let us return now to a more careful examination of the Massachusetts experiments. First, we find that the *Rural New-Yorker* is in error in stating that Massachusetts Bulletin 162 "gives, in detail, the results of eighteen years' work in testing different forms of phosphate." This bulletin does not report the work in detail, either by years or by individual phosphates. Neither the crop yields nor crop values are reported, but rather the computed increases in yields and values, and even these are reported by groups of years and by groups of phosphates, which furnish no possible basis for a study of variations, so necessary to a proper interpretation of the experiments. Thus, on page 151 of his bulletin, Dr. Brooks says:

"Many of the annual crop yields have been published in the reports of the experiment station, and certain averages only will be presented at this time."

I may add that the annual crop yields for only nine years are found in the published reports, but, by request, Dr. Brooks has very kindly furnished me the additional original data, and I am thus able to present the more complete records in the accompanying table.

"With all the facts before him from the crop yields secured, with the evidence that at least two soil types were involved, one of which is benefited while the other is injured by a given change in seasonal conditions, and with proof of a complete reversal of computed effect by a change in the methods of computing the increases, the thinking farmer must recognize that he himself represents the highest court, and his judgment must decide whether the eighteen years' work by the Massachusetts Experiment Station may or may not be properly classed as a phosphate experiment.

These data show enormous variations. Thus, in 1897, the acre-yields of corn were 66.9 bushels on Plot 1 and 76.9 on Plot 13, while in 1914 they were 79.6 bushels on Plot 1 and only 51.9 on Plot 13. These are both check plots, receiving no phosphate, yet No. 1 shows an increase of 12.7 bushels and No. 13 a decrease of 25 bushels in eighteen years.

These and other details secured plainly show that on the "more heavy soil," where the soluble phosphates were used, the addition of phosphorus was needed to maintain productive power, whereas, on the sandy loam, where the raw phosphates were used, the addition of phosphorus was not needed for general farm crops. The garden crops were benefited by phosphorus on both soil types, and the increase in cabbage by South Carolina raw phosphate was much greater than would be expected from previous investigations. (See report of Rhode Island experiments.)

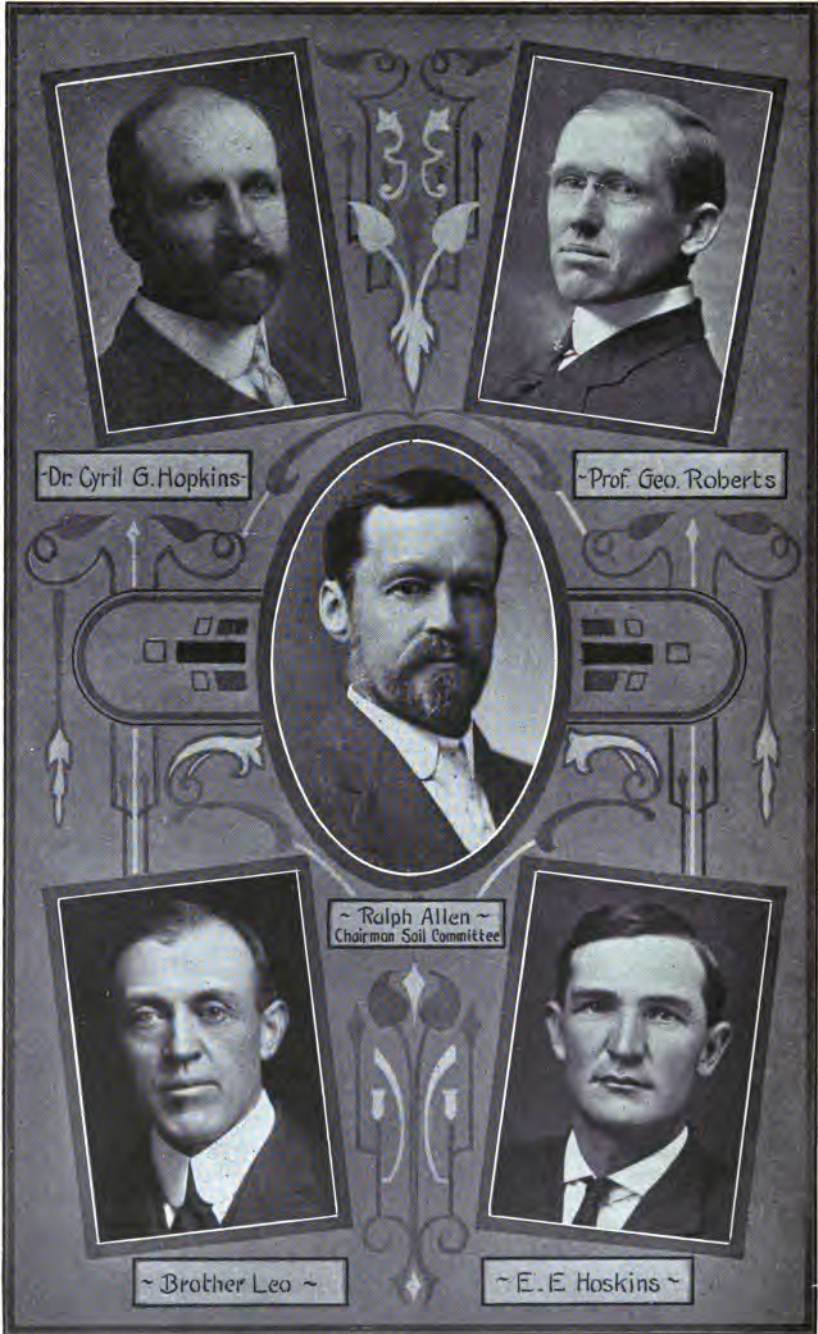
Concerning the 1903 cabbage crop, Dr. Brooks made the following statement in his annual report for that year:

"South Carolina rock gave a suprisingly good return, being exceeded in yield of hard heads by only one plot—the one receiving dissolved bone—while in total yield it is materially exceeded by but few."

It may be noted that the yield of hard heads with acid bone was only 6 per cent more than with South Carolina raw rock, while the corn yields of 1896 indicate a difference of more than 18 per cent in the land itself. By Dr. Brooks' present method of computation, South Carolina raw phosphate increased the acre-yields in 1903 by 22,746 pounds of cabbage, including 9,214 pounds of hard heads; while the increase by ordinary acid phosphate was only 20,800 pounds, including only 5,767 of hard heads.

In 1898 the acre-yields of cabbage where no phosphorus had been applied were 36 tons on Plot 1 and 18 tons on Plot 13, while they were 24 tons with South Carolina rock phosphate and 21 tons with acid phosphate. The combined cabbage crops of 1903 and 1908 were 8½ tons on Plot 1 and 5 tons on Plot 13, while they were 24 tons with South Carolina rock and 19 tons with acid phosphate.

The acre-yields of onions in 1901 were 279 bushels on Plot 1 and 123 bushels on Plot 13; and in 1902 they were 196 bushels on Plot 1 and only 26 bushels on Plot 13; while acid bone meal produced 3 bushels more than acid bone black in 1901 and 215 bushels more in 1902.



The yields of ensilage corn in 1904 were 14.2 tons with steamed bone meal and 20.9 on an adjoining plot with dissolved bone meal, while they were 22.9 tons with raw bone meal and only 15 tons on an adjoining plot with dissolved bone black; in one instance, the dissolved bone being 50 per cent better and in the other the undissolved bone. Compared with adjoining no-phosphate plots, the yield of potatoes in 1910 was increased by soluble phosphate 44 bushels on the "more heavy soil" on Plot 12, but only 4 bushels on the medium soil on Plot 8. The average increase in corn in 1913 and 1914 was 18 bushels with acid phosphate and only 5 bushels with acid bone black, while the averages for 1897 and 1899 show 2 bushels increase for acid bone black and 2 bushels decrease for acid phosphate.

On page 157 of his bulletin, Dr. Brooks gives figures showing the computed increases by different groups of phosphates for the corn crops of 1899 and 1914. According to these figures, raw phosphates decreased the yield by 2.4 bushels in 1899 and by .2 bushel in 1914, while the soluble phosphates increased the yield by 5 bushels in 1899 and by 15 bushels in 1914. In his comments, Dr. Brooks says:

"The latter [soluble phosphates] excel the rock phosphates in 1914 in a much greater degree than in 1899."

But this statement accords only with Dr. Brooks' recent method of computation. In January, 1915, in his annual report, Dr. Brooks showed that the increase in sound corn for 1914 was 14.2 bushels from the South Carolina rock phosphate and only 10.5 bushels from acid phosphate, while in May, 1915, in Bulletin 162, he uses a different method of computation, according to which the 1914 increases in sound corn were only 3.6 bushels by South Carolina rock phosphate and 25.1 bushels by acid phosphate. I do not mention this fact as a criticism of Dr. Brooks for recently adopting a method of computation different from that which he had used for eighteen years, but rather to show that to change the method of computation may completely reverse the conclusion.

I am privileged to present the original facts represented in the actual crop yields, and it is very possible that a clear-headed practical farmer may be better able to correctly interpret the original data with reference to their application to his farm practice, than either Brooks or Hopkins.

In studying the "cumulative effect," Dr. Brooks states that "the corn crop affords the best chance of comparison, having been grown in 1899 and in 1914."

But the average yields in 1899 were 81.1 bushels with the natural phosphates and 79.2 bushels with the soluble phosphates; while for 1913 and 1914 the average yields were 65 bushels with the raw phosphates and 63 with the soluble phosphates. These are the averages of the recorded yields, and it requires no computation for anyone to see that in this comparison the high-priced soluble phosphates have not excelled the rock phosphates.

Considering the marked variations and irregularities, I am unable to agree with the statement by the *Rural New-Yorker* that "it would be difficult to imagine a more thoro test than this one conducted by Prof. Wm. P. Brooks." The soil differences are not confined to variations in fertility, but they evidently include fundamental differences in soil types. Seasonal variations are of course unavoidable.

Many of you know even better than I that clover plowed under may sometimes double the corn crop or it may cut the yield in two, depending upon the time and the seasonal conditions. Many of you have seen oats yield 80 bushels and 20 bushels on the same field; you have seen 40 bushels of winter wheat and 3 tons of clover produced on land where in some other years both crops were complete failures. And yet we continue to plant corn and to sow oats and wheat and clover. And likewise we shall continue to spread phosphate to plow under with clover and manure, if on the average it tends to increase profits and to provide permanent fertility, even tho the results vary with the crops and season from apparent injury to large profit.

In the twelve-year experiments in Massachusetts, in which equal money values were used, three pounds of phosphorus in raw rock were estimated to cost the same as one pound in soluble phosphates; but in summarizing,

on page 156 of his late bulletin, the eighteen-years' experiments in which equal amounts of phosphorus were used, Dr. Brooks records the annual acre-cost as \$3.67 for raw phosphates and \$3.24 for soluble phosphates. His figures indicate a cost of \$13 a ton for acid phosphate and \$24.80 a ton for Tennessee ground rock phosphate.

INDIANA PHOSPHATE EXPERIMENTS.

In Circular No. 10, published in 1907, and in the annual report for the year ending June 30, 1914, the Indiana Agricultural Experiment Station has reported results from comparative experiments with rock phosphate and acid phosphate in Scott County in Southern Indiana. In Circular No. 10, Director Goss reports that the experiment was begun in 1904 with the application of 1,000 pounds per acre of rock phosphate at \$10 a ton and 715 pounds of acid phosphate at \$14 a ton; and he shows net profits per acre in four years of \$11.55 from rock phosphate and \$13.50 from acid phosphate. If, however, we count \$7 a ton for rock phosphate and \$15 for acid phosphate, the net profits become \$13.05 from the rock phosphate and \$13.14 from the acid phosphate, but with two-thirds of the rock phosphate remaining in the soil after the acid phosphate is exhausted.

In commencing upon these and other experiments, Director Goss makes the following statements on page 11 of Circular No. 10:

"During the first and second years, the rock phosphate produced little effect in either experiment, while the acid phosphate very materially increased the yields in both cases. During the third and fourth seasons, however, the rock produced very striking results in the Scott County experiment, even forging ahead of the acid."

"This and other similar investigations in progress lead us to believe that rock phosphate is a cheap and effective source of phosphorus where immediate returns are not required."

In the later Indiana publication (page 58), Prof. Wiancko reports only the computed financial outcome from experiments covering eight years in Scott and Pike Counties, from which he draws the following conclusion:

"These experiments, therefore, indicate that under the conditions prevailing on these two fields acid phosphate is a more profitable source of phosphorus than is raw rock phosphate."

No information is given concerning the crop yields, the prices allowed for produce, or the methods of computing the increases. The report shows that two tons (or six tons) of rock phosphate used in addition to, but not regularly applied with, farm manure produced an increase in crop values of \$8.21 in Scott County and \$22.55 in Pike County, but no comparison is reported for acid phosphate used in addition to manure. When used without manure in Pike County, the two tons (or six tons) of rock phosphate produced an increase of \$10.43 in crop values, while acid phosphate, apparently costing \$15.57, "showed a [net] gain of \$2.41" in eight years.

Concerning the comparative experiments in Scott County, Prof. Wiancko says:

"On the Scott County field, which is a light gray to yellowish silt loam that was in a low state of fertility to begin with, good profits are shown on all the treatments. The comparison of acid phosphate and raw rock phosphate used in conjunction with liberal liming has thus far shown that an application of 24 pounds of phosphoric acid in acid phosphate once in three years is more profitable than a two-ton application of raw rock phosphate put on at the rate of one ton per acre at the beginning of the experiment in 1906 and a second ton in 1911. The total value of the increase in eight corn crops and nine wheat crops, including straw and stover, and two clover hay crops which were removed from the land, has been \$87.41 for the acid phosphate and \$68.58 for the raw rock phosphate, yielding net profits of \$71.84 and \$54.58 respectively."

This statement is rather confusing, as 24 pounds of "phosphoric acid" per acre once in three years would make only 72 pounds of phosphoric acid, or $31\frac{1}{2}$ pounds of phosphorus, for the entire nine years, and this would be contained in $514\frac{1}{4}$ pounds of the common acid phosphate mentioned by

Director Goss. As an average of six consecutive years, with rational systems of permanent soil enrichment, the acre yields on the University Farm at Urbana have been 89.9 bushels of corn, 43.5 of wheat, and 3.82 tons of clover hay. Such crops would remove 53.7 pounds of phosphorus per acre in three years, or nearly twice as much as Prof. Wiancko provides in acid phosphate for nine years. Prof. Wiancko allows \$15.57 as the cost of the acid phosphate for three series of plots, which would be just \$20 per ton, but for six (?) tons of rock phosphate (two tons on each of three series) he seems to allow only \$14.

Whether this is a continuation of the Scott County experiment described by Director Goss as started in 1904, in which the rock phosphate was forging ahead of the acid, or whether that experiment was discontinued,¹ is not stated by Prof. Wiancko.

FERTILIZING ADVERTISING.

The recent computations and opinions reported by Dr. Brooks and Prof. Wiancko were apparently accepted by Prof. Williams of Ohio without reference to the original data or conditions. I may add that thru the influence of commercial interests an article based upon these statements and headed "Rock Phosphates Least Profitable" has recently been published by some of the unsuspecting newspapers of Illinois, ready-made forms having been furnished for the purpose.

This matter, advertising manufactured acid phosphates and discouraging the use of natural rock phosphate, has even been run in a newspaper without the knowledge of the editor, and at the same time the quotations for carload lots delivered at his railroad station were \$6.46 for 280 pounds of phosphorus in one ton of rock phosphate and \$36.10 for the same amount of phosphorus in two tons of acid phosphate. (For other types of fertilizer advertising, see Circular 165 of the Illinois Experiment Station.)

ILLINOIS PHOSPHATE EXPERIMENTS.

In 1904 investigations were begun with the use of different phosphorus fertilizers on three experiment fields conducted by the University of Illinois. Steamed bone meal, acid phosphate, raw rock phosphate, and slag phosphate have been used on the Odin field, in Marion County, and on the Mascoutah field, in St. Clair County, and all of these except slag on the Cutler field, in Perry County. After establishing a permanent experiment field on land donated for the purpose at Lebanon, the University discontinued the Mascoutah field only six miles away; but both the Odin and Cutler fields are still in operation. Potassium has been applied and crop residues turned under on all plots at Odin and Mascoutah, while limestone was applied to only one-half of every plot on these fields. At Cutler both limestone and potassium were applied to all plots, while one set of plots received crop residues,² and another set (not including bone meal) received no applications of organic matter. With one crop at Odin and with two at Mascoutah, the harvest was by whole plots, half limed and half unlimed.

The phosphates were applied in equal money values, based upon a cost per ton of \$25 for steamed bone, \$15 for acid phosphate, \$7.50 for raw rock phosphate, and \$19 for basic slag phosphate, the yearly acre-rates corresponding to 200 pounds of bone, 333 of acid phosphate, 666 of raw phosphate, and 260 of slag, applied in sufficient quantities but once for each rotation. Corn, oats, and clover were grown on all fields, also some timothy at Odin, wheat and cowpeas at Mascoutah, and wheat and soybeans at Cutler.

The crop yields and a summary in terms of crop values of all results secured in these investigations are given in the accompanying tables.

On the acid unlimed land at Odin, and where no organic matter was applied at Cutler, acid phosphate gave distinctly better results than raw rock phosphate, but the natural rock gave better returns than the acid

¹ A recent letter from Director Goss states that the Scott County experiments described in Circular No. 10 have been discontinued.

² Some commercial nitrogen was also applied in 1904.

phosphate on the other part of the Cutler field¹ and on both limed and unlimed land at Mascoutah, and also on the limed land, and as an average, at Odin. On the unlimed land at Qdin the hay sometimes contained much weeds, especially sorrel (*Rumex Acetosella*), so that in one season it sold for only half as much per ton as the hay from the limed land.

On the limed land slag phosphate gave better results than bone at Odin, and both slag and raw phosphate were better than bone at Mascoutah, while on the unlimed land the bone gave the best results.

With bone, acid phosphate, and raw rock, direct comparisons are possible with 49 crop yields, and these show a total return of \$116.56 from raw phosphate, \$113.15 from bone, and \$82.83 from acid phosphate; and if we include with these results those from 12 crops grown with no addition of organic matter at Cutler, the returns from 61 crops are \$139.65 from raw phosphate and \$144.67 from acid phosphate; but even with this comparison one may wish to take into account the fact that when the acid phosphate is all removed three-fourths of the raw phosphate will still remain in the soil for the benefit of future crops.

These and other investigations have shown that phosphorus is not the factor which first limits the crop yields on these southern Illinois soils, both limestone and organic matter being of greater initial importance. As an average, the increases thus far produced are scarcely sufficient to pay for the phosphates applied, altho the future residual effects may show profits with continued rational systems of providing organic matter.

ILLINOIS SOIL INVESTIGATIONS.

The Illinois experiment fields are used primarily to investigate Illinois soils rather than different kinds of phosphates or different salts of potash or the various nitrogen fertilizers.

It was taken for granted that earlier investigations by the eastern experiment stations and the conclusions drawn by their directors were trustworthy, and, consequently, that fine-ground raw rock phosphate was one of the best forms of phosphorus for use in the corn belt in connection with organic manures in systems of positive and permanent soil enrichment; and the data thus far secured in Illinois seem to justify the confidence we placed in the earlier work of the eastern institutions.

The only long-continued experiments we have made with different phosphates in direct comparison are those in southern Illinois at Odin, Mascoutah, and Cutler; but in the corn belt we have used steamed bone meal on some fields and raw phosphate on others, and the results, even tho not directly comparable, are of interest.

For twelve consecutive years the University of Illinois has conducted soil experiment fields with phosphorus applied in bone meal at Sibley, at Bloomington, and at Virginia, and with phosphorus applied in raw rock phosphate at Galesburg and on the South Farm at Urbana, with crop rotations including some legumes on all these fields.

At the prices mentioned above, and as an average of duplicate tests on three series at Sibley, one at Bloomington, and three at Virginia, 200 pounds of steamed bone meal per acre for each year has produced \$43.42 increase in the value of the produce in twelve years, while 500 pounds of rock phosphate for each year has produced \$42.53 increase in crop values as an average of five tests on each of three series at Galesburg and four tests on each of two series at Urbana. These figures are based upon 444 different tests with phosphorus. If the bone meal cost \$28 and the raw phosphate cost \$7 per ton, the net profit is \$9.82 from the bone meal and \$21.53 from the raw phosphate; and, after the bone meal is all removed in crops, 60 per cent of the raw phosphate will still be left in the soil for the benefit of future crops.

¹ The check plots at Cutler to which no phosphates were applied were under treatment for two years before the experiment with different phosphates was started, but of course all phosphated plots are compared with the same check plots. However, if a computed correction were applied, the value of all crops grown where residues and phosphates were added would be \$42.74 higher than shown in the table, thus giving an increase of \$39.79 for bone meal on the Cutler field. The values of the total increases in the 49 crops and in the 61 crops would thus also be increased by \$42.74 for every phosphate. This would not change the absolute differences between the phosphates, but it would change the percentage of profits on investments.

ILLINOIS PHOSPHATE EXPERIMENTS, ODIN AND MASCOUTAH FIELDS: YIELDS PER ACRE.

Soil treatment.....	RLPK	RPK	RLK	RK	RLPK	RPK	RLPK	RPK	RLK	RK	RLPK	RPK
Phosphate used.....	Bone	None	None	Acid	Rock	None	Slag					
ODIN FIELD.												
1904 Corn, bu.....	53.8	52.5	33.8	41.0	49.0	50.0	48.5	46.8	38.5	33.0	51.0	46.0
1905 Oats, bu.....	22.6		24.4				28.4		27.4		25.2	
1906 Hay, tons.....	1.64	1.06	1.06	.88	1.06	.71	1.08	.64	1.04	.57	.87	.64
1907 Hay, tons.....	1.64	1.06	1.06	.88	1.06	.71	1.08	.64	1.04	.57	.87	.64
1908 Hay, tons.....	1.58	1.06	1.46	.72	1.45	.70	1.63	.67	1.28	.47	1.66	.74
1909 Corn, bu.....	45.3	39.1	44.2	39.5	39.9	38.3	44.7	32.5	41.5	31.1	44.9	34.0
1910 Oats, bu.....	55.5	55.6	48.5	44.1	42.8	53.9	52.4	50.5	50.0	40.1	61.4	47.6
1911 Hay, tons.....	.93	.55	.92	.35	1.06	.83	1.25	.59	.99	.24	1.17	.48
1912 Hay, tons.....	1.50	1.26	1.31	.67	1.39	.93	1.52	.95	1.52	1.12	1.38	1.13
1913 Hay, tons.....	1.03	.84	.73	.49	1.00	.47	1.02	.55	.76	.41	1.04	.72
1914 Corn, bu.....	2.7	2.6	2.2	2.4	1.8	1.4	2.6	1.6	1.8	1.0	2.2	1.8
1915 Oats, bu.....	65.4	74.5	58.9	62.8	60.6	77.5	66.4	79.8	66.9	55.8	80.8	78.0
Value, 11 crops.....	\$177.56	\$155.34	\$147.46	\$122.71	\$158.11	\$143.91	\$172.92	\$135.67	\$155.06	\$107.51	\$181.93	\$137.64
Value, 23 crops.....	\$334.94		\$279.93		\$312.86		\$319.15		\$273.53		\$329.65	

MASCOUTAH FIELD.

1904 Corn, bu.....	63.3	60.7	50.9	48.9	53.9	50.8	54.1	50.7	46.1	36.9	53.4	42.4
1905 Corn, bu.....	26.7	37.2	28.4	32.3	29.6	28.7	35.9	31.2	34.0	30.8	34.3	30.4
1906 Oats, bu.....	20.8		17.9		17.9		18.3		17.0		19.6	
1907 Wheat, bu.....	20.3		19.0		20.4		20.2		20.1		17.5	
1908 Legumes.....												
1909 Corn, bu.....	51.8	50.5	49.9	48.5	53.2	47.3	54.0	55.5	49.2	50.2	52.4	59.0
1910 Oats, bu.....	56.3	64.4	56.4	30.0	56.1	66.5	59.4	56.4	64.0	44.9	66.4	48.0
1911 Clover.....												
1912 Wheat, bu.....	32.3	31.6	28.1	26.2	31.0	31.0	32.1	32.1	30.1	21.3	35.5	34.0
1913 Corn, bu.....	39.7	37.1	36.2	29.0	39.4	33.9	44.6	45.0	24.3	36.5	42.4	59.5
Value, 6 crops.....	\$145.57	\$154.61	\$128.36	\$120.19	\$140.89	\$137.95	\$151.16	\$145.86	\$132.50	\$116.46	\$153.31	\$148.85
Value, 14 crops.....	\$328.80		\$274.71		\$306.40		\$324.54		\$275.86		\$327.50	

1 Poor crops of clover, turned under; also a late crop of cowpeas in 1908.

ILLINOIS PHOSPHATE EXPERIMENTS, CUTLER FIELD: YIELDS PER ACRE.

Soil treatment.....	RLPK	RLK	LK	RLPK	LPK	RLPK	LPK
Phosphate used.....	Bone	None		Acid		Rock	
1904 Wheat, bu.....	21.0	8.2	10.0	23.1	24.2	20.5	13.1
1905 Clover, tons.....	2.74	2.11	1.80	2.52	2.40	2.51	2.06
1906 Corn, bu.....	45.8	50.0	43.1	46.2	52.7	52.5	47.3
1907 Corn, bu.....	52.5	54.7	56.9	60.6	51.9	63.8	43.8
1908 Wheat, bu.....	19.6	13.0	11.5	24.2	18.3	19.6	16.1
1909 Soybeans, tons.....	Turned	Turned	.61	Turned	1.04	Turned	1.11
1910 Corn, bu.....	39.8	44.6	44.8	35.2	37.9	46.2	49.3
1911 Oats, bu.....	18.4	23.8	20.8	16.7	23.8	20.0	24.4
1912 Clover, tons.....	Turned	Turned	.64	Turned	.65	Turned	.64
1912 Clover, bu.....	.67	3.08	.75	1.67	2.25	2.58	1.25
1913 Wheat, bu.....	34.7	29.6	27.3	38.8	37.3	37.3	26.2
1914 Corn, bu.....	3.6	4.5	2.7	2.1	5.8	6.4	8.8
1915 Oats, bu.....	35.8	39.4	30.2	40.9	39.8	29.1	34.2
Value, 12 crops.....	\$201.93	\$204.88	\$180.95	\$223.09	\$242.79	\$232.39	\$204.04
Value, 24 crops.....		\$385.83		\$465.88		\$436.43	

NOTE.—R=residues (corn stalks, straw, and cover crops plowed under), L=limestone, P=phosphorus, K=potassium (kalium).

ILLINOIS PHOSPHATE EXPERIMENTS: CROP VALUES PER ACRE.

(Prices per bushel: Corn, 50c; Oats, 40c; Wheat, \$1; Clover seed, \$10; Hay, \$10 per ton.

Phosphate used.....	Bone	None	Acid	Rock	None	Slag
WITH RESIDUES AND POTASSIUM: ODIN FIELD, 1904 TO 1915.						
With lime.....	11 crops	\$177.56	\$147.46	\$158.11	\$172.92	\$155.06
Without lime.....	11 crops	155.34	122.71	143.91	135.67	107.51
Total.....	23 crops	341.94	279.93	312.86	319.15	273.53

WITH RESIDUES AND POTASSIUM: MASCOUTAH FIELD, 1904 TO 1913.

With lime.....	6 crops	\$145.57	\$128.36	\$140.89	\$151.16	\$132.50	\$153.31
Without lime.....	6 crops	154.61	120.19	137.95	145.86	116.46	148.85
Total.....	14 crops	328.80	274.71	306.40	324.54	275.86	327.50

WITH LIME AND POTASSIUM: CUTLER FIELD, 1904 TO 1915.

With residues.....	12 crops	\$201.93	\$204.88	\$223.09	\$232.39	.....	.....
No residues.....	12 crops	.....	180.95	242.79	204.04	.....	.....

ALL FIELDS.

With residues.....	49 crops	\$872.67	\$759.52	\$842.35	\$876.08	.....	.....
Increase for phosphorus.....		113.15		82.83	116.56	.....	.....
All trials.....	61 crops	.....	\$940.47	\$1,085.14	\$1,080.12	.....	.....
Increase for phosphorus.....		.....	.....	144.67	139.65	.....	.....

NOTE.—The term "residues" means corn stalks, straw, and cover crops plowed under.

Even at these prices for produce, the bone meal did not pay its cost during the first six years at Virginia, nor during the last six years at Sibley, largely perhaps because the soil on those fields was deficient in decaying organic matter and some years nitrogen was the first element to limit the crop yields. Drouth and clover failures were also adverse factors in some years. On the other extreme, bone meal paid back about 200 per cent during the last rotation at Virginia and 300 per cent as an average at Bloomington, where, previous to the beginning of these experiments one of the best farmers in Illinois, the late S. Noble King, had made large use of legumes and crop residues and of manure, by hauling and spreading or by pasturing, and had thus put the land in perhaps the best condition for the utilization of phosphorus. But even better results have been secured under very similar conditions from the use of raw rock phosphate on the 500-acre farm of Mr. F. I. Mann, in Iroquois County, as shown by the definite records which he has already reported to the Illinois State Farmers' Institute.

Because of differences in the previous farming methods, in the local climatic conditions, and in the crop rotations practiced, the twelve-year records from the use of raw phosphate at Urbana and Galesburg are not directly comparable with those from the use of bone meal at Sibley, Bloomington, and Virginia, but they do show that natural phosphate has paid 200 per cent on the investment besides leaving the soil one and one-half times as rich in phosphorus as at the beginning. In the rotation at Galesburg $1\frac{1}{2}$ tons of phosphate paid back \$14.48 the first six years and \$19.77 the second six years while 1 ton of phosphate for each rotation at Urbana paid back \$11.80 the first four years, \$16.19 the second, and \$26.97 the third rotation period.

While the prices used for produce are perhaps fair for the landlord, they are too high for the tenant, except during recent years; but of course the crop prices used are the same whether bone meal or rock phosphate is applied.

VALUE OF PHOSPHORUS.

At your annual meeting in 1915, I made the following statement:

"Unquestionably a pound of phosphorus is worth more in soluble acid phosphate than in the insoluble rock phosphate; and possibly one pound of soluble phosphorus is worth as much as two of the insoluble; but certainly the information thus far secured from all trustworthy investigations does not justify paying four or five times as much for phosphorus in soluble form as it costs in fine-ground rock phosphate, if organic manures can be provided for its liberation in rational farm systems."

I still believe soluble phosphorus is worth more than insoluble, but the Rhode Island results with raw rock phosphate and double superphosphate make the above statement no longer unquestionable. And I may add that, with the increasing data from field experiments and with the increased cost of acid phosphate, I must now advise the use of raw phosphate rather than acid phosphate in general farming even tho it cannot be turned under with manure or clover at the beginning. Certainly much benefit is produced, especially upon such crops as clover, and some benefit upon the grain crops, by the liberal use of rock phosphate on most Illinois corn-belt soils, even with no special provision for decaying organic matter. When we consider the results of the twelve years' work in Pennsylvania, twelve years' in Maryland, twenty years' in Rhode Island, eighteen years' in Ohio, ten or twelve years' from different fields in Illinois, and also the results of many years of actual experience by Illinois farmers and the reports of critical observations of these trials by the county agricultural advisers, we can have no doubt that most crops receive benefit from raw rock phosphate used liberally, either with or without special provision for organic matter, which, however, must be provided in order to supply most economically the nitrogen required by grain and other nonlegumes.

In conclusion, we may well emphasize the fact that where phosphorus is deficient in the soil it must be applied in order to increase and permanently maintain fertility or productive power. At moderate prices either

bone meal, acid phosphate, basic slag phosphate, or fine-ground natural rock phosphate may be used with profit. When prices are sufficiently low, the more readily available phosphates are probably best, especially for garden crops or on soils which are deficient in decaying organic matter, or where the cost of raw phosphate is prohibitive; but even for garden crops, and also in beginning soil improvement for general farm crops even before adequate supplies of organic matter can be provided, liberal applications of raw phosphate may well be used when exorbitant prices are charged for other phosphates.

Even tho acid phosphate may be used when the cost is low, it does not follow that the farmer should also buy nitrogen and potassium in mixed fertilizers, altho they too have some proper place in market gardening and other forms of intensive agriculture.

The final question may be asked, What shall we do when the doctors disagree? Do nothing, is not the best answer to this question, but instead we should call for the original data, for the crop yields, or values, and other related information, and not depend solely upon the computed increases and opinions of others. And we must also be open-minded and ready to change our own opinion tomorrow if justified by additional investigation with accumulated trustworthy data.

PRESIDENT TULLOCK. Perhaps there may be some questions which you would like to ask?

Q. I would like to ask, in finishing up your statement, especially reverting to the Ohio lands, would you change your method of procedure as to Southern Illinois prairie land?

Dr. HOPKINS. The question is asked if in view of all the information now available I would change my procedure for the development of Southern Illinois prairie land. No, I would not change it from the statement I made to you a year ago down at Harrisburg. The first requirement for Southern Illinois prairie land is a liberal use of ground limestone, next to that a large use of leguminous crops, the legumes to be turned into the soil with crop residues, or in the form of farm manure; the third requirement is phosphorus. That is the same as I said to you a few years ago at Centralia.

Q. Would you apply the phosphorus ahead of the limestone?

Dr. HOPKINS. No, I would not apply the phosphorus ahead of the limestone, not under ordinary conditions. I would use the limestone first. I would apply the limestone ahead of the clover crops. Of course, gentlemen, that depends a good deal on the money you have to invest; in the matter of the soil I would not apply any phosphorus to the Southern Illinois land until I put about four or five tons of limestone on it, that would be my advice. If you have any more money to invest, in order to husband it as much as you can, there is no objection to putting on one or two tons of clover. The clover will help the phosphate to some extent. You might possibly add kanit, of course it is impossible to get it now on account of the war, but that will help the phosphate also.

Q. How much will the lime increase the clover crop?

Dr. HOPKINS. It makes the difference between clover and no clover. We had a harvest in one season of three and one-half tons of clover hay on prairie soil of Southern Illinois with lime phosphate, and right opposite that where we did not have lime phosphate on we had no clover at all, only a little tickle grass and sour grass.

Q. How about the belt of timber land in Southern Illinois?

Dr. HOPKINS. The timber land of Southern Illinois does not grow clover very well. It grows a little timothy. Nearly all of the timber land will be benefited by liming. It is not as good as prairie land, but you will find nearly all of the timber land of Illinois will respond markedly to liming.

I want to suggest that you ought to go on with that next address by Brother Leo, because he is going to talk on the subject of soil fertility and then you may want to ask him a lot of questions. You can ask me questions at any time in Illinois, but we do not always have Brother Leo with us. If there is time after that we may go further on this question.

PRESIDENT TULLOCK. Before Brother Leo begins his address we have with us a gentleman from Champaign who has been very active in promoting agricultural conditions in Illinois. Mr. B. F. Harris is going to talk to us just a very few minutes.

Mr. HARRIS. I am glad to take advantage of the opportunity, for so many of us have not the opportunity to address an audience like this, but, having no terminal facilities, I am afraid I would pass too many stopping points if I was not cautioned. My talk is merely an announcement, perhaps a word in advance, but it seems to me in many respects the most important question in the Union. The most important citizen in the Union and the most important man in the Union to-day is the farmer on the farm, tilling the soil, serving the people, and having a care for comfort, convenience and education, and doing his work as a citizen in the community. Perhaps the next most important man or citizen in the community is the banker who is working hand in hand with this farmer and doing his work as a citizen. Now, those are the two most important men, and then the two most important words it seems to me before the nation to-day are "citizenship" and "cooperation."

The field of good citizenship is just about as poorly cultivated as many of these farms we are talking about. I do not know of any subject to-day in this great crisis of the World's history, at a time when it means so much to the United States, that a great meeting like this should consider as well as the cultivation of good fields, the cultivation of good citizenship. I have asked Mr. McKeene—I have sent him one thousand copies of the Banker Farmer for complimentary distribution among you. All of you may not know the Banker Farmer, but about eight or nine years ago in this State, in the Bankers' Association in Illinois we created a State Agricultural Committee, and that work has spread all over the country until thirty-eight Bankers' associations have the same committee. It is a privilege and an opportunity to be able to address an audience in a community of this kind in connection with that work. We are getting out every month a nine by twelve, sixteen-page communication without any advertising, which goes to every banker in the United States. This particular issue, the February issue, of the Banker Farmer, has attracted more attention than any issue we have gotten out in something more than two and a half years, or rather about twenty-eight or twenty-nine months to be exact, with the possible exception of one number on "Education." This one we have here for distribution is devoted to one of the very biggest issues before the Nation to-day, the issue of good roads. While there are many vital problems, in all of our work for agricultural and rural life, it seems to me the salvation of most of those problems depends almost entirely on the matter of good roads in the State of Illinois and hence we took up that issue and pushed it. I want to say that we have heard from something like one hundred and twenty-seven towns up to this morning in response to this issue, and we are hearing from them at a rate of eight to ten a day and they come in from all parts of the State of Illinois. Out of that number there are perhaps ten or fifteen towns I never heard of, I thought I knew the name of almost every town in Illinois, or at least the name was familiar to me, yet there are at least fifteen or twenty towns in that list I have never heard of, showing that the most remote sections in this State are aroused to the proposition of good roads. I am not going to take any more of your time, except to say that those copies will be here for your use, and if any of you fail to get a copy if you will drop a card to the Banker Farmer, Champaign, Ill., you will get it without cost. Also on the back of the copy is a few copies of the story sent out from Champaign the other day entitled "Your Future and Mine." [Applause.]

PRESIDENT TULLOCK. Two years ago there came to our State a gentleman from Indiana, he came, he saw and was conquered by the Illinois system, he went home to Indiana and applied it. He is here to-day to tell us about it and I am pleased to introduce Brother Leo. [Applause.]

THE ILLINOIS SYSTEM OF SOIL FERTILITY FROM THE STANDPOINT OF THE PRACTICAL FARMER.

(By Brother Leo, in Charge of the Farm of the University of Notre Dame.)

BROTHER LEO, GENTLEMEN: I wish to say that I have just passed through a little siege of the grippe—perhaps the citizens of this State are never infected with such a misfortune, but it is true the people of Indiana are infected in that way sometimes, and that has been my misfortune. I thought three days ago I would have to give up coming here, in fact, about three days ago I had practically given up coming here on this particular occasion, and because of that fact I am going to be very brief and very short in my discussion this morning.

I am going to discuss what is commonly called the "Illinois permanent system of soil fertility." As I said I am going to be very brief.

A permanent system of soil fertility—What does it mean? What are the requirements? Is it a practical proposition? Is it applicable to the grain farmer, to the live stock farmer, or to the farmer who combines both grain and stock? I believe these questions are, in substance, the fundamental factors involved in a discussion of a subject of this character.

Time will not permit a treatment of this subject from a technical point of view. Consequently I shall confine myself chiefly to the practical side of the subject.

At the outset I wish to say that I am not and never have been a resident citizen of this State of Illinois. I was born and reared on a farm in Indiana. In view of these facts the question may be raised as to why I should have given preference to the system of soil maintenance promulgated by the Illinois College of Agriculture over that of other schools similar in character. In replying to this question I will say, first, that farming is a business proposition and a very important one, and in handling this proposition, as in all other lines of business activity, the success or failure accruing depends very largely upon the practical and economic methods with which the work is pursued. It was only after I had made a very thoro investigation of the various methods pertaining to the building up of unproductive soil that I definitely decided that the system outlined by the Experiment Station of Illinois was the system which involved all technicalities blended with profit and permanency.

By the use of chemistry and mathematics, we learn that crops are *not* made from nothing, but that they are the direct results of the utilization of certain chemical elements which the soil contains, or must contain, in conjunction with the elements of air and water. By the use of chemistry and mathematics, men have determined definitely the materials out of which crops are made. Also, by the use of these same scientific principles, men have specifically determined the amounts of these various chemical elements which different soils contain and which constitute plant growth, plant development, and plant maturity.

Now, then, we have a working base. By the use of these scientific principles and methods, these men have determined the exact amounts of these various chemicals and atmospheric elements necessary to produce one bushel of grain or several bushels of grain, to produce one ton of hay or several tons of hay, whether this grain or hay be produced on one acre or on several acres, it matters not. The Experiment Station of Illinois has pursued this work persistently and judiciously, and by the persistency and accuracy with which it has handled this deep, difficult scientific problem, it has finally procured positive and definite information as regards the soil fertility problem in conjunction with the profitable production of crops.

It is a fact, conceded by all, that almost everywhere in this United States of America soils which have been constantly cultivated for a period of fifty or seventy-five years have weakened in their power to produce crops as they once produced them. I am speaking now of soils where there have been no fertilizing materials added to the land other than the corn stalks or straw which grew on that same land. There are only a few instances, if any at all, where the crop yields have remained normal on normal soils after three-quarters of a century of constant cultivation with practically no plant food

added other than possibly a part of the crop residue in the form of straw or stalks. I personally know that there are lands in Indiana and Illinois which once produced reasonably good crops but are no longer at all productive.

Now, this problem of crop production has taken on a serious aspect; in fact in many instances it has become alarming. Right here we have food for the mind—food for the man that has a thinking mind and who will think, will study.

In the interest of the farmers of this State, the Experiment Station of Illinois has faced this technical problem fearlessly, honestly, conscientiously. The men directly connected with the experiment station have set to work to determine why soils, after years of constant cropping, actually do become unproductive, or at least do not produce as they once did produce in their virgin state.

The findings of the experiment station are to the effect that out of the ten or twelve elements, or materials, which constitute plant growth and maturity, there are just three of these which are now limiting crop yields on practically all normal upland soil of this and other corn-belt states as well:

They are nitrogen, phosphorus, and calcium.

Now, gentlemen, from the standpoint of a farmer who has seen both sides of this problem—the productive and the unproductive—I have every reason to believe that the findings of the Illinois Agricultural Experiment Station are absolutely correct, at least in so far as correctness in this scientific problem is possible.

Now, I am going to give you my reasons for my faith in this system.

In the beginning of the year 1900 I was given charge of 1,000 acres of cultivated land in the northern part of the state of Indiana. This land, or a large part of it, had been cultivated for approximately eighty years. It is what the geologists call a "sand loam," which means a composition of sand and clay. This land, in its virgin timber state, was quite productive. It produced corn, oats, wheat, common red clover, and potatoes. Crops of good quality and of reasonably good yield were produced.

The first of these various crops to fail on this farm was clover; and in the absence of clover all other crops gradually diminished until finally cultivation was no longer profitable and abandonment was the final result.

Now, as I already stated at the outset, it was only after due deliberation and thoro investigation that I decided to take up this subject of soil fertility and put into practice the system of permanent fertility recommended by the Experiment Station of Illinois, not believing, at that time, that my work would ever take on an educational character.

This farm, previous to my administration, was what may be called a grain farm; that is, grain only was being produced, in fact grain was the only kind of crop the land would produce and it produced very little of that, and some of the fields were already turned into the commons. Four, eight, and twelve bushels of wheat was the general average, the variations in yields being governed somewhat by weather conditions, for favorable or unfavorable weather conditions always were and always will be a factor in the production of crops. Corn yields previously produced on this farm ranged from nothing to twenty-five or thirty bushels per acre. My predecessor had long since abandoned all attempts to grow oats or potatoes.

As I have already stated, clover was the first crop to withdraw from the ranks. Now, it has been the general belief that the mere growing of clover is sufficient to maintain soil fertility, which belief of course is not true; in fact science has proved that the mere growing of clover where the entire crop is removed from the land is the best and quickest way of depleting the fertility of soil.

Now, as a matter of science, first of all, why was it that in our particular case the clover plant was the first of all the various crops to withdraw from active service? In answering this question I will say, principally because of lack of sufficient nitrogen in the soil to feed the plant. But science teaches that the clover plant is a legume crop and will take nitrogen from the atmos-

pheric supply. It is true that the clover is a legume; but it is equally true that clover takes nitrogen from the atmospheric supply only by means of the symbiotic relationship existing between the clover plant and a certain species of bacteria commonly called nodule-forming bacteria, and these bacteria exist or thrive only in such soils as are well supplied with calcium. Science teaches this.

The failure of clover in our case, and this is true generally where clover failures are prevalent, was not due to the lack of nitrogen only, but to the lack of sufficient calcium and phosphorus as well. After years of scientific experimenting I find that I can grow clover on our land by the liberal application of limestone; but to be able to grow a real crop of clover I must also supply phosphorus.

People too often deceive themselves in the belief that their land does not need calcium or phosphorus. They say they know this to be true from the fact that their land still grows clover—but what kind of clover? I have seen some of these clover fields, the clover only about a foot high, and one-third of that noxious weeds.

Now, these people are deceiving their own intelligence. From the scientific standpoint they are not growing clover at all; they are growing only a repast. The clover plant is half-starved because of the lack of sufficient calcium and phosphorus in the soil to feed the plant. I have taken this observation on our own land and in other parts of the country as well.

The Experiment Station of Illinois, in very emphatic terms, maintains that calcium and phosphorus are the factors now limiting the growth of clover on all normal soils, and this same experiment station further maintains that from the economic standpoint there is positively no other way by which the fertility of the soil can be kept up to a high standard of productiveness other than thru the growing of clover and by supplying to the soil the needed mineral elements.

I heartily agree with this station. My nine years of constant, persevering labor following the suggestions of the Illinois Station and the results I have obtained are a conclusive and positive proof to me that this station has solved this problem once for all.

The economy with which this system is blended is one big factor which appeals to me. By way of comparison of systems, keeping in mind the problem of economy:

The Indiana system of maintaining soil fertility consists, for the most part, in the frequent use of mixed commercial plant food, a combination of materials commonly called "two-eighty-two," costing approximately \$25 per ton. The fertilizing companies have come out this year in Indiana with a "Magic Brand" which they call "three-eighty-one," and because of the superior quality of this "magic" composition they have added \$10 per ton to its price, and the Indiana farmers are buying this composition.

Now, if these same Indiana farmers who are buying and using this mixed commercial plant food at a cost of \$35 per ton would adopt the Illinois permanent system, then they would realize that the only element of plant food which that \$35 per ton composition contains and which the soil of Indiana and Illinois really needs—which the farmers of Indiana and Illinois must buy under any and all systems—is phosphorus.

In view of these facts we must charge the total cost of \$35 per ton composition to the one element phosphorus. This makes that one element cost the farmer 50 cents per pound. By the application and use of the practical and common-sense system I am following, I am buying that same element of phosphorus for 3 cents a pound. Now consider 3 cents as against 50 cents, and this in part is what is meant by economy.

A practical, common-sense system against an impractical system; or what is better called no system at all.

Results are what we are all looking for. I am getting results, and I base my statements on my results. I know what I have done; I know how I did it.

Again, by way of comparison, by way of substantiating my assertion, by way of showing the real meaning and value of this system of which I am

speaking, I will give you a few definite facts. I have already mentioned the kind of crops previously produced on this farm and the approximate yields. I will now give you the results accruing from the system now being pursued.

The corn yield of our farm, depending of course somewhat on favorable or unfavorable weather conditions, has been increased until the actual yield for the past four years has ranged from 60 to 80, 90, and as high as 124 bushels per acre. Wheat yields, which previously ranged from 4 to 8 and 12 bushels, have been increased to 28 and 39.4 bushels per acre. Oat yields have been increased from nothing to 50, 60, and as high as 83 bushels per acre; potatoes from nothing to 250 and 300 bushels per acre. These crops are all produced on a rather large acreage. We have alfalfa on nearly 300 acres of land which only a few brief years ago would produce almost nothing but sorrel. We now have no trouble in growing alfalfa as well as clover, altho, as I have stated, clover was the first crop to fail under the old system of farming.

Now, the actual cost of maintenance is approximately \$2 per acre per year. This money is being invested in the raw mineral materials, or elements, commonly called calcium and phosphorus, the elements which previously limited crop yields on these sand loam soils.

Nitrogen, of course, was a big factor in the limitation of crop yields; but we have procured the nitrogen necessary to produce these large yields, of which I have just made mention, from the atmosphere by the growing of legume crops and not by a direct expenditure of money, as in the case of the man who is buying the \$35 per ton composition—a material, we are told, giving a net profit to the manufacturer of 300 per cent on all money invested.

I had a personal conversation about two years ago in Chicago with a certain gentleman who told me he had money invested in a commercial plant-food factory and that their annual net profits were 300 per cent. Be that as it may, men have a right to invest their money where they may reap the largest returns. That's a business proposition. The legitimacy or illegitimacy of such an investment is not for me to decide, but I know that farmers are not making 300 per cent on their money invested in farm land for the growing of crops. Notwithstanding, we are going to continue farming.

Before closing, I want to bring vividly to your minds an incident that took place on the 9th of June, 1915, which I believe will strengthen my statements in reference to the production of crops on our own farm.

Mr. Bishop, county agent of Livingston County, Illinois, in company with nearly one hundred farmers and landowners of that county, journeyed to our farm for the purpose of taking observations and investigating the results being obtained by the Illinois permanent system of soil fertility. These gentlemen were amazingly surprised at the crops they saw growing on this farm. Many of them declared that there was no such clover growing in Livingston County as that which they saw there that day.

Fifteen years ago the same land on which that magnificent crop of clover grew was an almost barren sand being carried by the winds into the high-ways and byways. There have been no 300 per cent profit making materials applied to this land, but the needed mineral elements have been supplied by the liberal use of ordinary crushed limestone from near-by deposits and raw rock phosphate just as it came from the grinding mills of Tennessee.

The question was asked if stable manure had not been applied. There had been no stable manure applied to that particular field in recent years.

These gentlemen saw the mowers cutting down the alfalfa. Here again they said better alfalfa was not to be found in Livingston County. They saw acres of wheat standing fully 5 feet high; and here too this land, on which that wheat grew which averaged 39.4 bushels, was previously a barren waste.

The people must be fed. This food must come from the soil. Crop yields must be increased. A better, a more practical, a more economic system must be introduced and put into practice. Positive and definite scientific agricultural information must be disseminated in the interest of the people. The farmer of to-day wants facts—facts based on scientific

principles. He will accept and use these facts. It is true that the average farmer is skeptical—and why should he not be so? He has been so gormandized by this “soft hot stuff” that it has become nauseating. Men too often set themselves up as teachers of agricultural science when in reality they are mere misconstruers of real facts.

Now, people, it may appear to the minds of some that I came here to display flattering words in the interest or in behalf of the men connected with the Agricultural Experiment Station of Illinois. I am sincere when I tell you I have no such thoughts in mind, but justice demands that I shall speak the truth. The Gospel says, “You shall render unto Cæsar the things that are Cæsar’s, but render unto God that which belongs to God.”

Q. Is your land sandy or clay, that is, what do the common people call it?

BROTHER LEO. It is sandy.

Q. What is your subsoil?

BROTHER LEO. The subsoil runs to a harder base. It is low, has gravel, and has sand; it has a variation of materials. Some gravel mixed in it.

Q. Is your land level?

BROTHER LEO. The land is level.

Q. Did you have to drain your land before you commenced?

BROTHER LEO. No, sir; it is naturally drained. It is naturally drained land and the finest land in the world to work. I believe it will produce bigger crops than any in Illinois. There is a certain gentleman here present who made a visit to our place and he went around picking up the soil in his hands, something I never saw a man do before; he did not say very much, but I am sure he did a lot of thinking and finally he asked, “What would this land produce if you filled it up?” Now, what did he mean? What was the real meaning of his expression “if you filled it up?” He was simply wondering what the land would produce if sufficient quantities of these materials I have just mentioned were used. When that is done, I say to you people, when it comes to the question of producing wheat or corn under the same weather conditions I will be equal to you folks.

I want to say in addition that no man can have the fullest appreciation of what the Illinois system of soil maintenance really means, in my case, except the man who saw that land fifteen years ago and compares it with to-day. That land was so light it was drifting into the hedges with every wind. I pulled the hedge fences out, plowed up the land and this year it produced eighty-three bushels of oats per acre. That simply goes to show what is possible for men to do if they put their minds to work. I thank you, gentlemen. [Applause.]

Mr. MARLIN. I am requested by a gentleman who is not here but who lives away in the southern portion of the State, whose farm is nine miles from the railroad station, to ask what he can do in regard to procuring limestone and rock phosphates.

Dr. HOPKINS. Well, of course if that man has some limestone outcrops on his farm or right close by he better get a small crushing plant, either himself or join with his neighbors and use an ordinary threshing engine. An investment of five hundred dollars or thereabouts would provide a small engine whereby he can crush his own limestone. If there is no limestone within easy hauling distance of the farm, or if the roads are bad from the nearest railroad station, at this long distance, he has got a pretty hard proposition. I am inclined to think the best thing that man can do under those conditions is to move nearer town. I know land that is selling at very nominal prices in Southern Illinois that is much closer to railroad stations than he is. It seems to me under the present Southern Illinois conditions he better try to get a little nearer town than to work with that handicap, as nine or ten miles is too far to haul limestone over bad roads. Of course ultimately he may get a railroad nearer, but that is problematical and he may just do a little pasturing and get his crops going fairly well on these lands that he has now, but if he is

not doing that he better change crops and put in a crop of Japan clover which grows good on that soil, or get a smaller patch of land, and have smaller crops, but nearer town.

Q. Is there any way to cure a small amount of acidity in the soil by fertilizer, aside from lime?

Dr. HOPKINS. There are some fertilizers which carry a little lime, bonemeal for instance. For example, pure bone carries a little lime, bone is not all phosphate, but it has a little phosphate, carries a little lime. Raw rock carries a little lime.

Now, you notice I read the result showing all those different conditions. When you are going to cure the acid in the soil you had better use ground limestone. It is even possible when you have to haul a great distance that you had better use ground lime, because sixty pounds of ground lime would be equal to one hundred pounds of ground limestone, counting the ordinary impurities which are found in it.

Q. Isn't it a fact that most of the Illinois soils have a certain amount of acid in them?

Dr. HOPKINS. Our soil has acid, but usually neutral, practically neutral, neither acid nor alkaline.

Q. A small acidity does not prevent the growing of crops?

Dr. HOPKINS. No, some clover will grow on neutral soil, there is some calcium there, but clover grows still better with limestone. As I say, if one must haul lime ten miles over bad roads then there is a question of whether he must not figure on hauling ground lime, although that is disagreeable to handle and the expense is very high, unless you have a very low rate on the limestone or unless you can get the cost of the ground lime greatly reduced you cannot afford to use that.

Q. I would like to ask what is the outlook in view of the increasing tendency or skyward tendency of potash?

Dr. HOPKINS. Potash all comes from Germany, from the Hartz Mountains where they have the potash mines. Some potash mines have been found, to some extent in Spain but they are not working them to any extent. Of course now it is impossible to get any potash salts, and there are only two things we can use, one is unleached wood ashes; in the leached wood ashes the potassium is taken out by the leaching, if they are unleached they contain about five or six per cent of potassium, that is, there is about one-half as much potassium in leached wood ashes as there is in unleached, which is one of the things we get from Germany. If one can get unleached wood ashes and put them on his farm it will answer the purpose. If you want to put on sixty pounds of phosphorus with the element of potassium, and if there are six pounds in one hundred pounds of ashes you can see you need one thousand pounds of unleached wood ashes to furnish that much potassium. The other material is organic matter. While organic matter is valued chiefly for its nitrogeous content, it contains potassium also.

There is potassium in farm manure, about eight pounds to the ton, and if you want sixty pounds all you need put on is about eight tons. You can also use for organic matter straw, for straw has been used and when it is well worked into the soil and allowed time to decay it will produce a benefit on the corn crop by the potassium it contains. It contains a very considerable amount of potassium. I think men who are farming that kind of land in these years, when there is no commercial potassium on the market, except wood ash, will do well to feed their crops in order to produce manure with which to grow crops on their land.

Q. On our so-called gumbo land, does that need lime?

Dr. HOPKINS. As a rule gumbo land, the low, black, heavy land is one of those types of land that contains lime. It is a sweet soil. Especially do we find gumbo soil containing it. Generally they are neutral, but once in a while we find they contain lime.

Q. On that proposition of the long haul of limestone in Southern Illinois, I wonder if the motor truck could not be used there? It has been used

by many people in this State for the purpose of transporting their material and successfully, too. It seems to me there ought to be some solution worked out so a man in the position mentioned in the question a moment ago can be helped. I know a few people in that same position that would be helped in solving their problems by the use of the motor truck.

Dr. HOPKINS. Now, that is one of the important benefits of a meeting like this. Here we have one thousand people, and perhaps there are some who are using motor trucks for these very purposes, or using them for other purposes who know very well they can be used for this purpose. I think you ought to make an announcement on that; I think there are agricultural experts here who will be able to solve that problem successfully, I have no experience on that.

Mr. HARRIS. We have the motor trucks but we do not have the roads.

Dr. HOPKINS. Mr. Harris said that they had motor trucks but did not have the roads.

Mr. HARRIS. At the time of the year when these roads are good it may be delivered, that is the common ground limestone phosphates, when we can depend on good roads, even if they are dirt roads. We have our stuff coming along in August and September usually.

Mr. GRANNIS. I would say that in Northern Illinois where we have good hard roads we can have limestone delivered cheaper than we can haul with our teams; I have eighty tons delivered at the rate of forty tons a day and it costs me about fifty cents a ton delivered on the fields a distance of about four miles. I just want to mention that in Will County there were fifteen hundred tons of limestone delivered on a farm by a motor truck this Fall, which cost \$1.60 a ton. The roads in that section are all good roads.

Dr. HOPKINS. The total cost of a quarry of limestone shipped possibly over the railroad and delivered possibly at the edge of the farm was \$1.60 a ton Mr. Grannis says.

Mr. GRANNIS. This was delivered directly from the quarry and delivered to farms within a radius of fifteen miles of the quarry.

Dr. HOPKINS. Crushed right there locally?

Mr. GRANNIS. Yes.

Dr. HOPKINS. There are a good many places in the State where there are limestone deposits ten miles or more from a railroad station. A good many of them are where there is no crusher at work, with acid soils all around, and we are trying to get people to put in crushing plants in all such places. A good many of them have gone into it.

Q. We have heard it argued that continuous cultivation will correct the acidity; that exposure to the sun will also.

Dr. HOPKINS. The question is asked whether exposing the soil to the sun will correct the acid. No, it does not do that. Continuous cultivation tends to increase, rather, the acidity. Organic matter is one of the causes of increasing acidity. The process is chiefly one of souring. As you know, all organic matter when it commences to ferment, tends to sour the land. The longer we cultivate land the more it tends to become sour from this decomposition.

Q. The discussion has been on Southern Illinois land; which is more needed, phosphate or limestone?

Dr. HOPKINS. I would say normally the first thing needed on the common corn belt soil is phosphorus, then limestone usually. In addition to that, the element needed first on most corn belt soils is phosphorus; there are some places even in the corn belt where limestone is needed more than phosphorus, particularly in the western part of the State where your glacial land runs away north. There is a tendency to more acidity in what we call the corn belt than there is in the Wisconsin glacial land which occupies the eastern—the northeastern part of the State.

Q. Wouldn't that apply to sand soil, too?

Dr. HOPKINS. Yes, sandy soil needs limestone first.

Q. Will heavy manuring increase the acidity of soil?

Dr. HOPKINS. Heavy manuring ultimately increases the soil acidity; also the first action of manuring in its decomposition is alkaline, but the ultimate effect of manuring is to increase soil acidity.

Q. Would it pay to sow clover and oats this spring or to plow that clover a year later for corn?

Dr. HOPKINS. The question is would it pay to sow clover and oats this spring or to plow that clover a year later for corn. In a normal year under normal conditions if you think oats make a good cover crop for clover that is profitable practice. It is a question whether people do not sometimes depend on that too much, as though that is all they needed to do for supply purposes, for supplying the actual nitrogen they need, that way. That is a good thing to do. But to supply all of the nitrogen we need we must have a system so that we can maintain a nitrogen supply.

Q. What is the difference between that method and allowing the clover to stand over one year and turning under one crop and taking off the seed of another crop?

Dr. HOPKINS. The question is asked what is the difference between that method and allowing the clover to stand over one year and turning under one crop and taking off the seed of another crop instead of plowing it in the spring, allowing it to stand over another year and then getting the seed crop out of it. That depends very much on the crop and the amount of seed you get. There are a good many factors there, and if we are going to sell grain chiefly from the farm we must adopt some system like that; carry over a good, big crop of clover, and turn it down and the revenue from that crop for that year will have to be very largely seed. If one is going into that system I suggest you have a crop of cutting clover, you can cut the seed out without much trouble and I would say that common red clover is the least advantageous because you have to take care of two cuttings to get a good crop. The first cutting you have to take too early. I would suggest either Mammoth clover or Alsike. Although sometimes we have collected common red clover a little earlier to make hay of it and allowed it to lie on the ground and the second crop comes up which has seed attached to it, and we have got three or four bushels of seed under that system. Then, again, we did not get any seed. It depends much on the weather conditions. But, on the Alsike clover the seed is all in one crop. It develops the seed, you harvest that, thresh it out and spread it back on the land. With the Mammoth clover just before you get a heading you can roll it flat. After you roll it it turns down, the heads turn up and then it produces a heading and you can cut that and leave nearly all of the crop on the land. Then there is sweet clover; sweet clover seed has been profitable to farms, for those who handled it in the recent years.

Q. I heard Mr. Hill say several times that he considered from his personal observation and experience that clover is worth ten dollars more plowed in the spring than in the fall. Do we get any more benefit by the spring plowing than in the fall?

Dr. HOPKINS. That is a matter that comes with seasonal conditions. There is no particular principle involved in it except the longer you allow clover to grow the more nitrogen and vegetable matter you get. There are a good many factors in it. I remember soon after I began work in Illinois that Mr. King, late of Bloomington, asked me whether I thought he ought to plow clover in the fall or spring. I said to him frankly I thought I had better ask him that question because he had perhaps forty years' experience and it was a matter of experience rather than any principle of farming. I asked him if he did not have an idea about it himself and he said that he certainly had, and he told me that he was plowing a forty-acre field of clover one year and one of his neighbors came along and said, "You are a fool to plow that this fall, you wait until spring and it will make you more corn and more grain." Mr. King was always a man to use his mind and he wanted to know things, so he said to me, "I finished up twenty acres of that and I let the other twenty wait until spring and then I plowed that. I weighed the corn off the two twenties, and the spring plowing made twenty bushels more corn than the fall plowing." I



said, "Did you try it again"? He said, "No, that was enough for me." I asked Mr. King if he would not try it again. I thought that was a thing that should be tried again before settling it, and he said, "Yes, I can do it all right." I saw him a couple of years later and I asked him if he tried that fall and spring plowing again and he said, "Yes, sir, I have; the fall plowing made eight bushels more than the spring plowing." That is about how it runs. [Laughter.]

As I say, the only principle is the longer you allow clover to grow the more nitrogen and vegetable matter you get. Sometimes you turn it up in the spring and the weather gets dry and it damages the crop very seriously, damages the corn crop. So, the man who is the best one to guess what the manner of weather is going to be is the man who best answers this question. [Laughter.]

Q. Wouldn't the average be better by plowing your clover in November than in the spring?

Dr. HOPKINS. The question is asked whether the average wouldn't be better by plowing your clover in November than in the spring. My guess would be, but I am not able to guess as well as you gentlemen are, would be to plow it in the spring, but not too late, not later than, say the 20th or 25th of April, and I want to be entirely free to change that guess after I heard from the others who have had more experience.

Mr. MANN. I suppose it makes some difference as to the kind of soil. I have plowed under thirty-seven crops of clover, always have a part of the field plowed in the fall and always a part of the field being left to spring to be plowed. Invariably the best grain has been on the fall plowing of clover.

Dr. HOPKINS. I think I will at once change my guess to fall plowing. [Laughter.]

Q. Is it better to pasture the clover or allow it to cure, or allow it to grow and turn down?

Dr. HOPKINS. The question is asked whether it is better to pasture the clover or allow it to grow and turn down. I would say that stock does not add anything to the land. In pasturing clover they never put back as much as they take off, so from the standpoint of the principle involved, being a question of the most nitrogen and vegetable matter you better keep the stock off. On the other hand, considering the financial standpoint and considering the need of the soil there, you need a part of it fertilized, and manure will furnish enough nitrogen and vegetable matter usually for that purpose. All of these conditions must be taken into account. If the land is poor in vegetable matter you had better allow it to turn down.

Q. How do you handle sweet clover to make seed?

Dr. HOPKINS. I don't think I had better try to answer that. I think the time is about all gone anyway, but there are those who will no doubt discuss that fully later in the session, discuss that matter fully. At any rate when you get Mr. Grannis on the platform, from up in Will County, Mr. Grannis being the farm adviser, you ask him that question.

PRESIDENT TULLOCK. I am sorry to close this discussion, but it is adjourning time now. I want to announce that it is requested that every one who has not already done so sign these registration cards and leave them in the lobby. It is especially requested that everyone from the Nineteenth District and the Twenty-fourth District be sure to sign them as there is some kind of a contest on. I believe that will close the session this morning. We will reconvene at 1.30 sharp, gentlemen.

AFTERNOON SESSION.

Tuesday, February 22, 1916, 1.30 o'Clock.

PRESIDENT TULLOCK. We will come to order, please. The program this afternoon will be opened by music by Mrs. R. C. Ledward.

Music—Selection Mrs. R. C. Ledward

PRESIDENT TULLOCK. The first address this afternoon will be on "The Work of the County Agent," by Mr. C. H. Oathout, consulting agriculturist of Champaign County.

THE WORK OF THE COUNTY AGENT.

(C. H. Oathout.)

LADIES AND GENTLEMEN: In looking over your program I notice that you have here "The Work of the County Agent" by "The Consulting Agriculturist" and a little further down, "What Farmers Can Gain by Having an Agricultural Improvement Association and a County Adviser." That is three names we have, but those are not all. Many people call us "fools" and I would not be surprised if they were in the majority. Sometimes I think they are almost right. In discussing the work, the methods and the results of the work in which one is engaged I suppose there is more or less danger of appearing egotistical at times, but I want to say to you that there is no more humble bunch of men in the country than the county agents or county advisers—whatever you want to call them—in Illinois, especially if they have been on the job more than two months. If any man went into the work with a notion that he knew a few things he was not at it very long before he got any such foolish notion as that out of his head. If I do not seem to be touching the points you want to hear about, and if there are any questions you want to ask at any time do not hesitate to bring them up.

The county agent is such a new factor in our agricultural scheme and the movement of organizing county improvement associations for the purpose of starting this work has spread so rapidly that many are asking the question, What is this new office of which so much is heard and what is its function in agriculture? Is it of real practical value to the farmer and will it be permanent, or is it a mere fad which will pass in time as other fads do?

In answer to the first question let me say that the first counties to organize in Illinois have at the present time been doing work but three and one-half years. The county agents in these counties had in the beginning absolutely no precedents to follow. No one had done the work before, at least in such a way that it would satisfy Illinois farmers. There was no leader who had been thru the mill making his way from the bottom up and knowing all of the points of advantage and the pitfalls to be avoided. Those in authority over the county agent, meaning no disrespect whatever, had only ideas of what the work should be with no practical experience back of these ideas. In other words the county agent had a job but what the job was and how to do it nobody knew.

However, it was quite generally thought and deeply felt by those who are thinkers and leaders among their people that a vast amount of scientific knowledge concerning farming had been accumulating for years at our experiment stations and that this knowledge if it could be given to the farmers in such a way that they could see its connection with their work on the farm would mean millions to the farming interests in general. They knew that in the eastern and southern parts of the United States there were hundreds of thousands of acres of abandoned land; that, to use an idea often expressed by Dr. Hopkins, not one of our representatives in Congress could reach the National Capital from any direction without seeing on all sides lands which were once productive and valuable, now almost worthless and to be bought almost for a song. They knew that even in the southern part of our own State there were thousands of farms that produced a very poor living for those that undertook to farm them and that unless something were done soon to build up this soil it too would be abandoned. They knew that even in our own rich corn belt the soil does not till as easily nor produce as well as it did a few years ago, and that if land values were to be kept to their present high plane or to advance, this soil must be made to produce more than it ever did before.

They were certain that the experiment station knew the remedy for these ills, that it had in fact been trying for years to give these truths to the people by sending out tens of thousands of bulletins and circulars to all parts of the State, free of charge to anyone who would ask that his name be put onto the mailing list. But the extremely unfortunate thing about this is that very few people to whom these bulletins and circulars are sent read them and fewer still actually digest them and get the full significance of the facts they contain.

The scientists at our experiment stations tell us that the scientific facts that have been proven are very few compared to those that are not known; that they are just beginning to learn a few fundamental truths; but even though this be true, it is certainly a fact that the practical application of scientific knowledge is away behind the attainment of knowledge. In other words, it will be years before the majority of farmers take advantage of even a small part of the scientific knowledge we now have. This is not an argument in favor of discontinuing scientific investigations, for these must always keep away ahead, but it is an argument for pushing harder on the rear and trying to bring the practical application of knowledge up nearer to the knowledge itself.

How to do it, there is the rub. To quote from L. H. Bailey: "All this wealth of knowledge; all this valuable material must be made use of and the proper herald is a person, a man who shall live in a community and be a part of it." So here is the first duty of the county agent, to take to the people the facts worked out by the State Experiment Station and show them how they can make practical use of these facts. This covers a very wide field as the investigations of the experiment stations reach into every phase of farming, soil work, live stock, dairying, horticulture, farm crops, poultry, etc. And the man who performs this task must know both the scientific and the practical side of at least the most important of these phases. No man can know all things even about farming, but we in Illinois are very fortunate in having an experiment station which has probably done more in the line of work that is of real practical benefit to the farmer than any other experiment station in the United States. Assistant Secretary of Agriculture, Carl Vrooman, in a talk at the University of Illinois last fall said that in order to learn by actual contact with the farmers just what the county agent was doing in different parts of the United States he had employed a man, who was a very keen observer, to visit farmers in all parts of the country to learn this for him. And he said they learned that more was being accomplished in Illinois than in any other state, because the Illinois Experiment Station had given the county agents some definite fundamental facts to work with. C. B. Smith, agriculturist in charge of this work throughout the United States, said at the St. Louis Conference of State Leaders in County Agent work, "It must be remembered that of all the states of the North and West there was just one (Illinois) where the State Agricultural College had worked out a clear cut, definite scheme for improving the agriculture of the State and was ready to stand behind the plan in any particular county. In that State each agent started out with "lime, raw rock phosphate and clover," as a slogan. In practically every other state the problems of each particular county were in large measures not worked out, neither by the State Agricultural College nor by the Department at Washington.

I might add that perhaps there is another reason, namely, that a committee composed of members of the faculty of the College of Agriculture must pass upon every man appointed as county agent in Illinois before that county can get the Smith-Lever Funds. This committee has ruled that in order to receive such an appointment a man must be a graduate of a college of agriculture as good as that of Illinois and that he must have had five years of successful, practical experience subsequent to graduation. Such requirements are not made in other states and it often happens that a college graduate with no practical experience is appointed. Furthermore, there is behind the work in every county in Illinois an association consisting of the

best farmers and landowners of the county. This feature is undoubtedly just as important as the others.

When a county agent comes up against a problem that is too much for him, as is necessarily the case with each of us at times, the State Agricultural College and Experiment Station is always ready to help us out.

Enough has already been said to show you that the scope of the work of the county agent is very wide. There are, however, certain phases of the work which will occupy the major part of the county agent's attention in each county. The maintenance of soil fertility is a problem on which all are working and the introduction of alfalfa is another. As State Leader, W. F. Handschin points out in an article published not long ago in the Farmer's Review, the use of raw rock phosphate has been increased in a few years from practically none to several thousand tons annually in counties having agricultural advisers, and while the census of 1910 shows 18,344 acres of alfalfa in Illinois, 46.3 per cent of which was in four counties in the northern part of the State, in 1915, three years after the first two county advisers started work, the fourteen counties in which the work has been in progress two years or more have, according to the best estimates, close to 100,000 acres. Mr. Handschin also says that the increase in those counties having advisers is much more rapid than in adjoining counties having no man. Now the value of this one item is hard to estimate. Any attempt to give it a value in dollars and cents will result in but a rough guess. It means that on a very large per cent of the farms in these counties horses and colts can have proper feed and that these farmers will not have to expose their stock to the debilitating effects of severe winter weather and starvation rations and to cornstalk disease, as many were forced to do in the winter of 1914-1915 with very heavy loss, from lack of other feed. It was figured that in Champaign County alone the loss from cornstalk disease during that winter was \$75,000 to \$80,000. It means that calves that heretofore have been half-starved through the winter, coming out in the spring thin, stunted, and worth but mighty little, can be profitably fed on these farms and come out in the spring worth fifty dollars to sixty-five dollars each. It means that pork can be profitably produced, even with high priced corn and low priced hogs. The farmer who raises alfalfa, admires its beautiful green from early spring to late fall, sees the way his stock relishes it and grows, is a better farmer financially and morally than he was before.

Every county agent has made a campaign each year on smut treatment for oats with the result that hundreds of thousands of acres have been treated where almost none were treated before. We could figure the exact profit of this work if we could learn the exact number of acres treated, but this could not be done without taking a census. In Champaign County the yields from 151 fields were reported this season. The treated oats averaged 5.7 bushels per acre more than the untreated. In Livingston County a difference of 5.6 bushels per acre resulted. In 1914 in Tazewell County they had a difference of seven bushels. Of course this is not as accurate as experiment station work but when we consider that several thousand acres of oats and all kinds of farmers, soils and methods of putting in oats are considered on each side, we must conclude that the chance for error is not very great. It has been estimated by authorities that about eight per cent of the oat crop is lost by smut. The figures given above come close to this. Considering the loss as being eight per cent, see what the eradication of smut in a county like Champaign, raising 160,000 acres annually means. It means that 12,800 acres, twenty square miles, of land could be devoted to some other crop and we would still raise as many oats as we do with the smut present.

If all the oats raised in Illinois were treated for smut, we could quit raising them entirely in Champaign and La Salle Counties or almost any other two of the largest counties of the State and still raise as many bushels as we do at the present time. If all the oats of Champaign County were treated, the saving in one year would pay the cost of supporting the work of the Agricultural Improvement Association for thirty years. As stated before, we cannot tell just how many have treated for smut without

taking a census. The reason is that at all of our meetings, whether they are for the demonstration of smut treatment, the selection of seed corn, or for whatever purpose, there are many more who are not members of our association than there are who are members. We urge all nonmembers to take advantage of what they learn and very many of them do so, but we have no way of getting at them for exact information. And so with all the activities of the county agent the effect of the work extends much beyond the active members of the association and its exact value in dollars and cents can only be roughly estimated. This much is certain, however, that smut campaigns will be kept up until but little smut is left to talk about.

I have so far spoken of a few things that are taken up in all the counties and in these respects the work of all county agents is alike. There are, however, certain industries which are of major importance in some counties but only of minor importance in others. In some counties for instance many of the farmers are in the dairy business and dairying is of such importance that it takes a good deal of the county agent's time.



Farmers are all deeply interested in how to prevent smut in oats.

In these counties cow testing associations have been organized for the purpose of finding out what cows are paying and what ones are not. In one such association as a result of the information thus gained by the dairymen, according to report by Mr. Crandall of the Dairy Department of the University of Illinois, there was an increase of 1,052 pounds of milk and 52 pounds of butter fat per cow per year and in another an increase of 1,411 pounds of milk and 53 pounds of butter fat. Of course, the county agent does not do the testing of the cows, as the work of one association of twenty-five members will require all of one man's time, but he helps to organize such associations and to keep them going after they are organized.

In several counties where Percheron horses are raised extensively, notably in McLean and Tazewell Counties, and each individual had been working by himself and to considerable disadvantage, Percheron breeders associations were organized so that all producers would work together, thus bringing about many advantages that could not be had by the individual working by himself. This kind of an organization makes it possible for all the members to join together in getting the best of breeding stock and in formulating rules governing the use of this breeding stock. It makes

better marketing possible, and marketing is certainly one of our biggest problems. In Tazewell County they had a sale last fall at which thirty-two head, mostly yearlings were sold for an average price of \$306. The highest price paid was \$704. Since then they have sent a pair of mares to Alabama, another to Florida, and a carload to Kentucky. Their county Percheron breeders' association is becoming generally known all over the United States and the time is rapidly approaching when there will be a quick sale at a good price for everything they have in the Percheron line just as soon as it is ready for the market.

Their horse market problem is solved, the solution has been brought about by cooperation, and the cooperation has been brought about by the county agent. This is just a start. This work is new. Who can say where it will end?

In Dekalb County it was found that little clover seed was sown and that what was used was not generally of good quality. They took up the matter of the purchase of clover seed and bought a large quantity for the members of their association. Contrary to the general notion this did not put all of the local seed dealers out of business, but those that were honest and sold good seed at a reasonable price found that their business increased while those who did not sell good seed had to quit.

The experiment station had found by its variety tests that the Western Plowman corn was the best variety for the farmers of Dekalb County. So their county agent bent his energies toward getting seed of this variety and getting farmers to use it. They have gone into the seed business quite extensively and at the present time they have in their seed house 1,500 bushels of clover seed, 800 bushels of alfalfa seed, 700 bushels of timothy seed, 50 bushels of rape seed and 2,000 bushels of seed corn. Last year they handled \$34,000 worth of seed.

They have hired an extra man to have charge of their seed business, and expect to purchase the large abandoned schoolhouse they have been using for a seed house.

This plan of handling seeds does not work in all the counties, however. In some places it is probably better for the county agent to use his influence for better seed but let local dealers furnish it.

In Champaign County I have from the beginning urged farmers to adopt a systematic rotation of crops and plan of soil treatment. With a view of getting this going I have gone over the farms with them and made maps showing how the farms could be divided into fields, the crops to put onto each field for a number of years until the rotation is going and where and when to apply rock phosphate and limestone. These maps with a written explanation of the plan are returned to the farmers. As a result of these suggestions in 1914 the purchasing committee of the association purchased 66 carloads of rock phosphate for its members, twelve carloads being ordered one day. Owing to the bad season for handling it, not so much was ordered in 1915. The work of different county agents has brought about a condition in the purchase of rock phosphate that is more satisfactory than it has even been before. Now a purchaser can buy material and satisfy himself that it is up to the guarantee. If it is not as good as guaranteed he does not pay as high a price. His weights also are guaranteed and he does not have to settle on the basis of railroad weights. The plan has been very satisfactory and men have joined the association in Champaign County in order to buy rock phosphate through its purchasing committee.

In Winnebago County the county agent, Mr. Ten Eyck, has organized all his forces in such a way as to effectually combat the hog cholera. His committees consist of members in all parts of the county so that outbreaks of the disease are reported as soon as they appear. Everywhere in counties having agricultural improvement associations this dread disease is being combated by the best known methods and sanitary and quarantine measures are being urged. We feel that there is much yet to be learned

concerning the serum and virus treatment and that great care should be observed in its use.

I have spoken so far of things that have to do with making money. There is another phase of country life which has been sadly neglected in the past and that is the social life. County agents have been instrumental in nearly all cases in organizing farmers' clubs which have as an object not simply better farming, but better farm life in general. I will just describe one or two of these which I think are typical of many others. One of these was organized in the winter of 1913-14 in a country church six miles from a village. The town hall stood a few rods from the church. A farmer who had previously been a school teacher was elected as president. A membership fee of one dollar was charged. They have their meetings regularly, at times having speakers from a distance and at others using home talent on their programs. They are very much interested and their membership has increased rapidly. They got the county farmers' institute to hold a meeting there in the summer of 1914. This was the most successful institute in the county, and the first one ever held out in the country away from any village. It was so successful that in 1915 a two days' meeting of the farmers' institute was held in the same place. There had been a decided change made in the place during the year which intervened between the two institutes. The church had been redecorated and a basement put under it. This basement was equipped with a dining room and kitchen. The town hall, which in 1914 had looked just like all country town halls, had been cleaned up and repainted on the inside. This was used for the exhibit of farm products and of household science work. I have never seen so good an exhibit so well arranged at any other county farmers' institute I have ever attended. These people are going ahead with their club. It has already done a great deal for their community and its possibilities are infinite.

In another instance a woman's club was organized in the county several miles from a village. The women have met regularly and at certain times have the men present at their meetings and have a general good time. In such instances the house at which the meeting is held is taxed to its capacity. The club is the liveliest thing in that part of the county. It is making life in the country more bearable for those women and they are not only having a good time but are educating themselves along household science lines, for at their regular meetings they have speakers from outside or papers prepared by some of their own members.

These are typical of the many clubs that county agents have helped to start and help to keep going after they get started. In many cases the people were ready for the movement and only needed a leader to help them get started. In other cases they have needed education first and the creation of a desire for this kind of work brought about by seeing what others are doing.

It might be interesting in passing to note that in several instances county agents have very effectually put a stop to swindling games that have been undertaken against the farmers. In one case it was a cure for hog cholera, in another it was to contract for the purchase of rock phosphate at half price, in another it was the sale of a low grade of phosphate—containing fertilizer at a price several times as high as good rock phosphate could be purchased for. Sufficient to say that after these games were exposed by county agents business stopped immediately.

County agents are not only taking to the farmer the work of the experiment station but they are bringing to the experiment station the problems of the farmer in such a way as it has never been done before. Questions concerning the growing of new crops, their value as feeds and the methods of handling them are constantly coming in and the county agent must go to the experiment station for answers. The county agent goes onto the farm, studies the farmers' problems with him, finds out what they are all the way through, including the practical use of any methods of solution that may be offered. It may happen that the experiment station has discovered a fact but has not studied how best to apply it in actual practice on the farm. Witness for instance the treatment of oats for smut. For years it has been

recommended to use for this a pint of formaldehyde in forty gallons of water and then use a gallon of this solution to the bushel. No definite tests have been made to see if this was the best strength or not until within the last two years. County agents have called attention to the fact that this makes the oats so wet that it takes a good deal of time and work to dry them out so that they can be sowed. As a result of work already done not more than half as much water is used as formerly and it is probable that before many more seasons pass we will not use more than one-fourth as much water to the pound of formaldehyde, and that a pint of this solution instead of a gallon will be used per bushel of oats.

Questions concerning new crops have been constantly coming in. How should this crop be planted, how should it be cultivated, how harvested? What is it good for? It was found that in many cases the experiment station had no answer to these questions, or such answers as could be given did not fit Illinois conditions. And as a result of the fact that county agents impressed upon the experiment station the importance of having reliable home grown information about crops other than the few that are commonly raised, the farm crops division started in 1915 its crops garden in which many new crops are being tried out. In 1916 this work will be extended so that the crops garden will cover ten acres.

To put it in as few words as possible, the experiment station and the county agents are cooperating to solve the problems of the farm in the most practical way.

A line of work that is just being taken up in this State is that of farm management study. This is a line of investigation that has not been given much consideration heretofore. One man has farmed for several years and failed while another with no greater opportunity has made a marked success. Why is it? We have always laid it to a difference in men and doubtless that has a great deal to do with it. But there are also other differences which have a great deal to do with success or failure. And it is these points that we are trying to work out so that we may be able to say to the man who is not succeeding, "Here is your weak point. Change your system at this point and you will do better." The work is too new yet to make any definite statements concerning it but there are a few things that are indicated quite strongly in the records taken on 81 different farms in Champaign County this winter. For instance the man who is working the most projects on his farm is making the most money. The man who sells corn, oats, wheat, dairy products, hogs and poultry, is making more than the man who is selling only corn and oats. The differences have ranged from 3.5 per cent to 9 per cent on the capital invested, or from \$9 to \$22 per acre net. The ten best farms averaged as much corn on 78.4 acres and as much oats on 66.9 acres as the ten having lowest yields raised on 100 acres of each. Those who had alfalfa raised as much hay on 53 acres as those who had timothy and clover raised on 100 acres. It was found also that the average farmer is selling at least one acre of land each year in the fertility contained in the crops he puts on the market, in excess of any provision he is making for putting fertility back into his soil. One of the great factors which influences the expense of running a farm and consequently the net income to the farmer is the horse labor. It was found that these men were handling all the way from 9 to 33 acres of crops with one horse. Neither those working but nine acres nor those working thirty-three acres were getting best results, but the men who seemed to be doing the most efficient work and getting the highest net returns were the ones working on an average about twenty acres per horse and were living on farms ranging from 160 to 250 acres.

There are other points of interest but as the work is so new and more or less inaccurate, for in taking the farm records of over 80 farmers in Champaign County we found almost none who kept accurate accounts, I will not dwell on it further. We hope another season to get most of these men to keep accounts so that at the end of the year we may get figures that are more accurate and as time goes on and we get these records year after year from the same men and from many others we hope that their

accuracy and importance will increase and much practical use can be made of them. In other words we expect to apply to farm management the same careful search for points which make for efficiency as is applied in other lines of business, with a view of being able to lay before the farmer plans which will increase his efficiency and consequently his income. It is my belief that greater immediate results are possible along this line than along any other and if we constantly and persistently make the maintenance of the fertility of the soil a part of every recommended plan it seems to me we will be well on our way toward a system of permanent agriculture.

"Cooperation," "team work," "pull together," are expressions we hear a great deal nowadays. Dean Davenport has called attention to the fact that the most important thing in this work is the farmers' organization which gives to farmers that sense of cooperation and unity that makes for strength and progress and which has been so lacking among farmers in the past. And the fact that farmers contribute funds for the support of the association which pays a salary to a man to help them with their knotty problems adds to and strengthens this sense of unity. Farmers are just beginning to realize the fact that "in unity is strength" and unless the signs of the times are very misleading the strength of the united farmers will be manifest within a very few years.

On the 26th of January there was organized at the College of Agriculture the Illinois Agricultural Association which is to consist of the various county associations as members. This movement is of great significance the full extent of which only the future will tell. There is little doubt but that other states will follow this lead, and what is to prevent in the near future the formation of a National Agricultural Association. As the various farmers' organizations progress in this cooperative movement vexing problems such as that of satisfactorily marketing farm products will be solved. It is not the intent or purpose of farmers' organizations to mix in politics, but the time is coming when if these organizations see fit to take a hand in any political move their influence will be greatly felt if not an absolute deciding factor.

During the last three years in which the county agent work has been in progress there has been such a general awakening of interest in improved methods of farming as has not been seen during any other period in recent years. The actual demonstration of these methods on the farm has caused hundreds and thousands to adopt them who would not have been induced to do so by any other plan. The effects of the awakening are seen in the demands for men, for speakers, for demonstrators, the increased numbers who visit the experiment station, the larger attendance at farmers' meetings and the better farming that is being done generally. It is made manifest by the movement for better schools for country children. In Champaign County several township high school districts have been organized during the present winter.

Is the work permanent? It is believed by those most interested in it that all signs point to its permanency. It is thought that before many years a county without a county agent will be as much of a curiosity as one would be to-day without a county superintendent of schools. [Applause.]

PRESIDENT TULLOCK. Mr. Marlin of the Twenty-fourth Congressional District has an announcement that he wishes to make.

MR. MARLIN, LADIES AND GENTLEMEN: Pardon me for interrupting you at this time, but the director of the Twenty-fourth Congressional District wants to promote the attendance of the Institute, and also wants to promote scientific agriculture, and has induced Mr. Seaman Hall, one of the real apple raisers of the State, to send up a barrel of choice apples. The arrangement is that each of the counties within the Twenty-fourth Congressional District may compete for this barrel of apples by calling on the Credentials Committee and signing up. We want everyone who is here from the Twenty-fourth Congressional District to do that before five o'clock. Then these apples are to be opened to be eaten by everybody in the lobby of the St. Nicholas Hotel immediately after the evening meeting.

I hope you will compete for these apples. Don't forget to sign up.

PRESIDENT TULLOCK. I wish to remind the audience of the exhibition of the various agricultural products and clubs on East Main Street, and you are all cordially invited to attend there at the close of this meeting or at any time and examine them. The next address will be "The Illinois System of Permanent Fertility and Results on a 320-Acre Farm," by Mr. J. C. Mies of Livingston County.

THE ILLINOIS SYSTEM OF SOIL FERTILITY AND RESULTS ON A 320-ACRE FARM.

(J. C. Mies.)

LADIES AND GENTLEMEN: I thought the best way I could present my work was by the use of charts showing what I did each year as I went along. I am simply presenting these from the standpoint of a farmer. If there is any of you men that understand the scientific part of it and any of you advisers notice I make a mistake, I wish you would correct me; I do not wish to have this go out and have it to go out wrong. I do not know the scientific part of it, and if you like you can ask questions and we will make a kind of a round-table talk out of it.

The first I ever knew about clover was when as a boy, I was sent out by my father to pick the heads from a small patch of clover, and the following spring he sowed this clover and we got our start from clover in that way. I was taught all that was necessary at that time was to sow clover and that that was the salvation of our fertility. Sow clover, plow it under, sow some more clover with our grain, plow it under in the fall, and that was all that was necessary to keep up the fertility of the soil.

Along in 1895 after the Institute started, I attended the Institute and became somewhat interested in that work. A number of years later I was induced by a man who was born and raised in New York to try two tons of phosphate. He took it on himself to order a carload of phosphate to be delivered at Fairbury, and he wanted every farmer to use two tons, simply as a matter of experiment, because he had seen land in New York go from \$150 an acre down to \$50 an acre, and he told me that he wanted the Illinois farmers to do something so that would not happen in Illinois.

I got no apparent results from this phosphate for four years. Why? Simply because I put it on bare ground, no humus, organic matter or clover.

After I became interested in this work I was elected president of the Farmers' Institute at Fairbury and the farmers said, "We want Dr. Hopkins; he has been at Pontiac and we want him." I immediately wrote Dr. Hopkins and he wrote back and said he would come. As near as I can recollect, Dr. Hopkins made these two statements; I do not know as I can quote the exact words, but he said, "The way you are using clover around Fairbury is the fastest way in the world to use up the fertility of your soil." The next statement was that if a man owning 200 acres of land, would sell forty acres and apply the Illinois system of permanent fertility on the balance, he could make more money from the 160 acres than from the 200 acres. Dr. Hopkins, you know, as all our Institute speakers do, immediately left the town. Several days later I went down town and a number of farmers, who were honest and sincere about their questions and work, wanted me to explain Dr. Hopkins' statements. They said, "We do not understand what he means. We always thought that if we sowed clover, the next year we would get a bigger crop of corn, a bigger crop of oats and raise more corn. We thought that was the way to keep the crops going. We do not understand what he means when he says if a man will sell forty acres and apply the Illinois system on the balance he can get more on the 160 acres than on the 200."

I had secured Dr. Hopkins' appearance there and I could not go back on Dr. Hopkins. I personally understood what he stated, but, by the time I explained to these men what Dr. Hopkins meant, I was thoroughly convinced myself that something beyond clover, something else besides clover was necessary, so I began to get busy and study my soil somewhat. I read the bulletins more thoroughly and began to digest what was in the bulletins,

and began to get acquainted with the speakers going out and talking from the Institute.

Now, the condition of my soil; the top of the soil is a sandy phase of brown silt loam, part of it gravel and part over gravel. Sometimes we can hardly distinguish which is which. Very low in nitrogen and phosphorus and physically it is low in organic matter and humus. Some of that land has been farmed fifty-five years continuously, grain farming without any residue being plowed under; part of it rented out to other farmers, and straw hauled away and corn stalks fed off by their cattle, being driven back and forth every day in the winter. Consequently it was robbed about as hard as you can rob a farm.

In 1909, after I had been to the State Institute and heard more about phosphate, but still seeing no results from two tons I put on the four acres in the fall of 1906, I went to work and applied another nine tons on twenty acres, or 900 pounds to the acre. In 1909 after hearing the Institute speakers at the State Institute, I made up my mind that there was something to phosphate although I had gotten no results. I found out from them that I had not used it rightly; I had put it on ground that was too low in organic matter and humus to liberate it. I did not see any results from that which I put on in 1906, but in 1910 when I got it to clover, why, the clover was considerably different. Probably, now, if I explain on the chart, I can explain these results as I go along. (Indicating on the chart.)

From 1906 on. There is no tile on the north part of the farm. Sandy phase brown silt loam on gravel or over gravel. Down here, (indicating), we have some tile. This is a low yield, not a large one, my yields are low all of the way through. I have no large outstanding yield to show. Notice the arrangement of the farm. Mr. Oathout called attention to that a minute ago, about the county agent helping the farmer to form or establish a rotation in his fields. Building lot down here (indicating), and a hedge through here (indicating). A long way from this field down to the building; no fence down there at all, no arrangements; no definite rotation; just oats and corn. Corn thirty-five bushels and oats thirty. Poor clover down there (indicating), corn forty bushels, and there is where I put my 800 pounds of phosphate on the ground. When I say poor clover, I mean it was so much so that it was necessary to plow it up; corn forty-five bushels, oats thirty-seven bushels there (indicating). In 1907 I began to raise fall wheat; notice the yield of wheat there, twenty-seven bushels. It shows good clover, that clover was sown on the 17th day of March, and if you farmers remember, we had a very warm March that year. My neighbor adjoining had sown on the 15th of March with the oats on stalk ground and disked it, and then the ground was frozen solid after that and he lost his clover but mine was simply sown on the wheat ground and had not started when the ground froze. Oats over there forty bushels (indicating). Down here fair clover (indicating). I sowed oats and part of it froze out and so I had a thin stand and I sowed my clover after the freezing. Corn down here forty bushels (indicating). Very early spring and summer rain. If you have any questions about these charts as we go along, I wish you would ask the questions.

Q. What have you over there where you say B. L.?

Mr. MIES. Building lots. That is the same all the way through, B. L. there. 1908 was a very wet spring. Corn planted in June. The year has something to do with these yields, as we all know, climatic conditions. Corn, thirty bushels; this is clover here (indicating). Made hay and a seed crop. I was still robbing my land; I had not gotten up to the standard of the Illinois system of permanent fertility. Wheat twenty-two bushels (indicating), fall wheat. Phosphate showed no results in 1908. Oats twenty-five bushels; corn twenty-five bushels (indicating). Oats and corn. On account of the wet year lost part of my oats and corn. B. L., building lots. I tried some corn and cowpeas. I tried cowpeas and soybeans several times, but never have had very good success, probably not enough organic matter and need of bacteria. There is 1909 (indicating). A good

year, summer rains; oats forty bushels; corn forty-five. I put on that phosphate that I was telling you about a minute ago. In 1909 phosphate showed no result as to the two tons I put on. Wheat seventeen bushels (indicating). I was in the sheep business then, twenty acres in sheep pasture. Forty acres clover (indicating). Corn forty; corn forty-five there, and corn fodder down there again, corn forty. Yet it shows a good year, not very large yields.

Q. What clover is that you are cultivating there in 1909?

Mr. MIES. That was red clover. The reason I had it on there, that field for some reason before I came there was rag weeds. When I got that in clover the clover was very small, following that wheat, and when it rained I had to hire men and we went in there and clipped it and we raised our mower shoes as high as we could. In several weeks there was a wonderful difference in the clover. It had destroyed these weeds that were robbing the soil of the fertility and it was a wonderful improvement. I tried to carry this in sheep pasture, this twenty acres, in 1909. In 1910 I had a little phosphate put down there, it shows clover. The results show something remarkable. It was so noticeable that anybody walking over the field could tell the difference. Put on in 1906 and no results until 1910 when I put my clover on. That clover is shown on the other chart. Put sheep on the thirty-six acres here and the lambs that year netted me \$18 per acre. Notice the poor clover. Corn forty bushels (indicating). That was where I had sheep in 1908. Corn down there (indicating), forty bushels; oats thirty bushels. In 1910 the clover was doubled and as I said, the result was something remarkable.

Q. Where your clover was doubled had you clover on there before, with phosphate?

Mr. MIES. No, sir; that is what I was calling your attention to, you see I put the phosphate on the bare ground, then corn in 1907, oats in 1908, wheat in 1909 and clover in 1910; the phosphate brought me the good clover.

Q. No difference in the corn, oats and wheat?

Mr. MIES. No apparent difference. I had several neighbors looking at it, but could not see any apparent results. 1911, corn thirty-five bushels (indicating). Here I want to call your attention to 1910, a great many farmers in Livingston County began to sow spring wheat; we thought that would be a better paying proposition than oats, so I put in spring wheat, got twenty-two bushels, I thought that was pretty good, and the next year I put in twenty acres and got six bushels to the acre and that ended my spring wheat. [Laughter.]

Q. Did you sow clover there?

Mr. MIES. No; I did not sow any clover in the oats.

Q. Would it be advisable to sow that to clover and plow under for oats the next spring, that is, if you are in a location where oats would grow better than wheat?

Mr. MIES. You mean put clover in oats and then plow clover?

Q. Put it in clover in the spring and allow it to go along and plow it late in the fall or spring for oats?

Mr. MIES. We would not think of doing that in Livingston County. Oats do not do well with us at all on fall plowing. 1911 corn thirty-five bushels (indicating). Fall wheat nineteen bushels (indicating). Spring wheat six bushels (indicating). Look at this; in sheep pasture two years and in the spring of the year of 1911 I ordered a carload of phosphate and never having handled the phosphate in carload lots, I ordered it in sacks and in the spring, in April, I put about 1,500 pounds per acre on ten acres of spring plowing. Plowed early in the spring, put it on after I plowed it. Put on 1,500 pounds to the acre and left the rest of it lie in the shed all summer and had my money invested in it. Then in the fall I put the balance of it on this sheep pasture, 1,300 pounds to the acre. After that I made up my mind the best time to put on phosphate was directly from the car and save the handling of it, and since then I have always done that, from the car directly onto the field.

Q. What did you ever sow in the sheep pasture?

Mr. MIES. That was second year clover. Went in there and sowed some oats and wheat. The clover was poor. I had nothing else and I had to let the sheep in there. I put on some clover. Oats down there thirty-five bushels (indicating). Oats up here is thirty-five bushels (indicating), not very large yields. Tried for alfalfa in 1911, limed a little piece up there. While liming that I limed that also (indicating). I want to say right here that I was so busy with the phosphate that I did not have time to put on limestone, doing half of the work myself; so all the lime I have on my farm at the present time is fifteen tons, but next year I have an extra man hired and I am going to put on more limestone.

Q. What did you pay for lime at that time?

Mr. MIES. For that lime of 1911—we had no association then—that lime cost us \$1.50 a ton, laid down. Brought in from Kankakee.

Q. How much is it to the acre?

Mr. MIES. I put two tons to the acre, possibly three tons to the acre there. I put it on very heavy because I was trying for alfalfa, put it on a little strip down there (indicating).

Q. What does it cost you now?

Mr. MIES. A little over one dollar a ton, \$1.02 or \$1.05.

Q. Do you get it from the same place now?

Mr. MIES. No, sir; most of our lime comes in from Chicago.

Q. What did you use to release the phosphate on the small pasture there where you said you had corn?

Mr. MIES. I had clover in there once before. I don't know as I called your attention to it, but I had that in clover before I put on the phosphate so the organic matter and the humus contents of that field were not so low as the other part of the farm.

Q. I would like to ask you how you scatter it, by machinery or hand?

Mr. MIES. The phosphate by machinery. I bought one of the first Peoria machines made, eleven feet wide, with a carrier at each end and scattering it as you go along.

Q. How did you like that as compared with these other machines?

Mr. MIES. If I were buying another one now, I don't think I would buy it because there is an extra handling of it.

Q. Isn't the same company putting out a different pattern?

Mr. MIES. Yes; they say it works first-rate with limestone now. If I were going to buy one of them—Mr. Mann, what do you say is the best machine to buy?

Mr. MANN. They are just beginning to manufacture one at Cissna Park, which is just about as near perfect as any of them can be. It is not on the market now, but it will be shortly.

Mr. MIES. Notice on the bottom of the chart, if I fail to call attention to it, there is a reason. "Good year." Year of 1911, suffered with drought; 1912, you all remember that was a good corn year and a good oat year, very wet cool spring, but very hot summer. The cool spring made us our oats and the hot summer made us our corn, so that accounts for the good yields on there.

In the spring of 1912 I went up to Dekalb County and was talking to Mr. Eckhart. I realized at this time that there was something in this work and in 1912 I made this remark to Mr. Eckhart, "I wish they would organize in Livingston County. But I have not heard anything about it. Is it possible for me to get a soil man to go over my farm?" And he said, "Certainly." And I said, "Where could I get one?" He said, "Write down to Urbana," and he gave me the names of three or four men and I wrote down there and in the fall of 1912 I got one of these men who went over the farm and he made me a soil map, and he was surprised at the yields on that type of soil, and he said, "I do not see how you got the results you did."

Q. How much does it cost to have it analyzed?

Mr. MIES. It cost me at that time \$13 a day, there were two of us and we had the man at ten dollars a day and his expenses, two days.

Q. The question was, "How much did it cost to analyze it?"

Mr. MIES. I did not have it analyzed; I thought he knew his business. I had phosphated it quite a bit and I wanted to know whether I should lime or phosphate that soil, and that man was like our Institute speakers, stayed one day and was gone and I could not get a hold of him, but our county man, if he comes out there and fails I have a chance to get at him.

You notice the result of my phosphating there. In 1912 I put it on twenty acres there and you notice the result was very large, that field yielded 53 bushels. I told you a while ago I had sheep on there one year, I had sheep on there two years and applied phosphate to the same kind of land, this field had two years sheep and 1,300 pounds of phosphate. This field had one year of sheep and no phosphate (indicating). The yield of corn there is fifty bushels where I had sheep one year and the yield of corn there, 71½ bushels where I had sheep two years and 1,300 pounds of phosphate per acre. Oats 78 bushels per acre where I had put 1,500 pounds of phosphate per acre. Corn there on old ground. I never got any clover on it, tried three or four times and never got any clover. Sheep pasture down here (indicating). Very cool spring and rather a warm summer. I



This is a view of a 60-acre field on the Meis Farm in the summer of 1914. The crop of clover is the first successful crop grown on this field, but a good many crops have utterly failed. This clover was sown in spring of 1913 with oats, and during the hot, dry summer, it apparently died, but when the late summer rains came, considerable clover appeared, and Mr. Meis decided to apply one ton of rock phosphate per acre and let the clover stand. The above view shows the result.

tiled that (indicating), cost \$500 for the outlet. I tiled this up here and this up here, too, cost me \$1,500 to tile those one hundred acres. It is the best money I ever spent. It looks like a large amount of money for one hundred acres of land, but the balance of the farm did not need any tiling, that is the only part of the farm that needed any tiling.

In the winter of 1912 and 1913 we organized in Livingston County the County Association, and this map that I had the man from the University make, that map was used all over the county and the people began to realize that a soil man knew something about soil. If a man can make a map, he knows something about soil. This was the biggest inducement for people to join the association. The association probably got more out of the map than I did, undoubtedly. Mr. Bishop made a big map and took it all over the county and said, "Here is a soil map and it shows you what a man can do for you."

In 1913 I had that in clover (indicating). In 1913 had phosphate there; probably if we cut that for hay would probably have one ton of hay, and down there two and a half tons of hay (indicating). Mr. Bishop had arranged to take a party of farmers to Urbana; there was a demonstration

there on the 14th day of June, and they had intended to go there, but after he discovered this phosphating I had done and two other patches of phosphating in that neighborhood, he made up his mind that a demonstration here would be more beneficial than to take them down to Urbana. It was a matter of increasing clover; that was what Mr. Bishop was after and he realized the importance of clover in Livingston County. Notice here (indicating) on the 17th day of June we had seventy automobiles standing out in that corner, averaging better than four people to the auto; there were probably close to three hundred people seeing the difference between this clover and that, on the same type of land exactly, excepting that this had phosphate and that did not.

Coming back to these two fields here, that was spring plowed, put in exactly the same, this corn made 48 and this down here 38 (indicating). Oats forty bushels. Put in sweet clover up there because I had lime up there; I failed on alfalfa, the alfalfa all failed. I sowed in sweet clover. I heard about inoculating clover and I made up my mind if there was anything to it I would put that in. I had a good stand of clover on this field



This is a view of a 40-acre field the same year—same type of soil, but newer and richer, on the same farm, but no phosphate was applied on this field.

in 1909 and I did not inoculate that. This field (indicating), never had clover on from the time it was broken in 1853. I inoculated that and had good clover here I did not inoculate it down here and had poor clover, yet this land had clover on it in 1909. Since that time I never sow clover without inoculation.

Q. Did you glue that?

Mr. MIES. That was Government inoculation. Mr. Bishop recommends the glue system rather than the Government; thinks it is a little safer. I think it was Dr. Hopkins this morning told you something about that.

Returning to our yields of crops, corn on phosphate, corn and clover, plowed under, 20 bushels to the acre. The year of 1914, a hot summer, no fall rain, only 20 bushels of corn to the acre. Sweet clover on that field made me two and one-half bushels of seed to the acre. This clover here was clipped about the first day of June and allowed to go to seed and only got three-fourths of a bushel of seed. We have this up in our county; if we put phosphate on our red clover we get such a large growth that if we clip it once in June or about the 10th of June, along about that time, it has a tendency to smother the rest of our clover. What do you think about it, Mr. Mann, do you think that is right?

Mr. MANN. No, sir; you kill your clover by clipping it too early. If you wait until later on you fear smothering. If you cut clover or alfalfa before it should be, you are pretty sure to kill it.

Mr. MIES. What stage do you think it should be in before it is clipped?

Mr. MANN. When the first head shows, it shows it has reached the equilibrium between the soil moisture and the height of the plant. That would be, say from the 12th to the 15th of June, in that week, in this latitude.

Mr. MIES. This field, oats forty-five bushels; this field, oats thirty-eight bushels, having an increased yield there in two corn years of $31\frac{1}{2}$ bushels; the oat yields, seven bushels, the same identical land under the same conditions. The one field, having as I called your attention to a while ago, two years of sheep and 1,300 pounds of phosphate per acre, and this field having one year of sheep and no phosphate. The gross income from these 36 acres for three years was \$113.67, and the gross income from this field for three years (indicating), making a difference for the extra year of sheep and 1,300 pounds of phosphate of \$26.13. The next year I had this in wheat,



This is a view of a 5-acre strip of sweet clover across one end of the 60-acre field shown in the first picture. This sweet clover was sown for demonstration purposes and the picture shows a part of the first cutting put into cocks. A portion is left on the ground for soil improvement.

It is worth while to note that while 55 acres of this field has an abundant crop of red clover, live stock seek and eat the sweet clover first.

1915, 27 bushels of wheat sold at \$1.03 a bushel makes a gross income of this for the four years of \$115.35 and a gross income of this field for three years of \$113.67, a difference of only \$1.68. I noticed this morning you were interested in clover. In 1914 most everybody lost clover. Sowed twenty acres of clover in the oats there, mixed red clover and sweet clover in 1914; a low, black ground, contains lime, kind of a gumbo land, had a good stand of sweet clover there. Up on the higher ground had no sweet clover.

Q. How about the red clover? Did you get any red clover?

Mr. MIES. No red clover whatever in 1914; lost all of it. Hot summer, no fall rains, showing the sweet clover there (indicating). We had a number of stands of sweet clover in the county. Where I had lime in the soil we had sweet clover, but where we had no lime we had no sweet clover.

Q. How did you cut your sweet clover?

Mr. MIES. Two and a half bushels in 1914.

Q. How did you cut that?

Mr. MIES. Binder.

Q. Should that grow up in the spring?

Mr. MIES. That was clipped about the 22d day of May and left on the ground and the second crop came up.

Q. Cut it very high?

Mr. MIES. Cut it high enough so as to have some branches and leaves underneath; if you cut it down close enough you kill it.

Q. Did you ever use it for pasture?

Mr. MIES. In 1913 I used it for pasture; I had twenty-five head of cattle running over this field. This field, after the seed was taken off, shows it has good clover, and the cattle would go right across this field up to that field and eat sweet clover in preference to red clover in 1913. In the fall of 1914 when I had no red clover and they should have eaten sweet clover, they would not eat it, proving to me that there must be different varieties of white blossom sweet clover.

Q. What time did you mow your red clover?

Mr. MIES. Along about the first of June, I don't know as it makes any difference. Is that right, Mr. Mann?

Mr. MANN. Before the 1st of June.

Mr. MIES. I mow mine on the 25th of May.

Mr. MANN. That is right.

Q. Do you bind the bundles?

Mr. MIES. Yes, I bind the bundles. I would prefer to make rather large shocks and put on several bundles for caps, would shatter more in small shocks; then we let it stand a couple of weeks. Cut it a little on the shady side of green so it won't shatter so much. After it stands one or two days it will shed the water and you will not have any trouble.

Q. Do you think there is any benefit in clipping clover, common clover?

Mr. MIES. Our soil man thinks so. He advises us to do so because it forms the seed a little later, during hotter weather.

Q. I think the clover depends largely on the seed more than anything else.

Mr. MIES. I cannot say anything on the clover, because I have never been very successful and I cannot brag about the clover seed crop. I am wrong on the clover question, or something else.

Q. How do you sow the clover?

Mr. MIES. I have a four-year rotation; corn, oats, clover and wheat. Sowing the clover in the oats, sow the oats first, disc the oats twice, then sow the clover seed and harrow again. On the wheat I sow the clover about oats sowing time and then harrow.

Q. The chances are you are not going to get any clover then?

Mr. MIES. Well, I am changing my method.

Q. Cover your clover seed a little deeper and roll your ground.

Mr. MIES. Well, I think the seeding clover proposition depends on the type of soil. I think myself, I can sow my clover a little deeper than some of the rest of the boys in Livingston County; I have a sandy soil.

Q. Dr. Hopkins rather gave the impression this morning that the clover seed changes in the second crop of clover, is that the belief?

Dr. HOPKINS. Ordinarily red clover does not produce much seed in the first run, there are exceptions to that when you get this far south or further south it very frequently does produce seed. The first crop of clover may produce seed, further north it does not, it comes in the second run.

Q. The reason I put that question is because in our county, down in Cass County, we really have been more successful on the first crop than on the second. Two or three years ago we had a neighbor down there that had five bushels to the acre on forty acres on the first cutting. There were several that had that yield. On the second cutting they got very little; that is the reason it is a question to me whether it is an advantage to clip the first crop.

Dr. HOPKINS. Wait until your first crop is well grown, then you can tell whether there is any seed in it. We do that sometimes in Champaign County.

Q. Would the clipping of clover before the seed shows help the second clipping? Having that act as an mulch for the second crop?

Mr. MIES. Our soil man, Mr. Bishop, recommends that—says that red clover develops rapidly in the fall if it is a good fall for it and it ought to be good so it will not form seed. When it forms seed it will die. He recommends clipping, clipping high, in the hopes it will check the forming of seeds. In 1913 I put on 120 tons of phosphate and in 1914 I put on 80 tons. In the fall of 1914, 65 tons; in the spring of 1915, 25 tons; in the fall of 1915, 30 tons, making now on the 320 acres, 360 tons of phosphate at a cost of \$2,200, a little over \$2,200. The clover in 1914 where it was clipped down had three-quarters of a bushel of seed, it then was plowed under and the wheat averaged 38 bushels on the 60 acres. Oats, 76 bushels; corn, 50 bushels; wheat on this 36 acres, making 33 bushels, this down here only making 27 bushels. I put phosphate there in the fall, I do not think we got any results. I put several sacks of phosphate there, with manure, in 1913.

We had several green streaks where we put on our phosphate and manure showing the phosphate that was put there in 1913. I broke up the old pasture there (indicating), and I had this sweet clover pasture in the fall (indicating). I told you the cattle would not eat it. I had my old pasture there (indicating), and I put my cattle in there, locked them in there and they had to eat it.

Q. What does it cost you?

Mr. MIES. I went to my three neighbors on the north and east and I asked them what their yield of corn was, and while we were threshing I kept track of their yield of wheat and oats, so, making a comparison with my neighbors I know of an increase of twenty bushels of oats per acre, an increase of seven bushels of wheat and an increase of ten bushels of corn. Wheat sold at \$1.03 a bushel; corn sold at sixty-five cents a bushel; oats forty cents a bushel. I got an increase this year on a half section of \$1,800 for phosphate put on. That is not all phosphate, that is clover and phosphate combined.

Q. How about manure?

Mr. MIES. We make just about enough manure to nicely cover twenty acres. We have twelve head of horses and one or two colts, running about thirteen or fourteen head of horses and eight or nine cattle.

Q. Do you get enough manure from them to cover twenty acres?

Mr. MIES. Yes.

Q. How much do you put to the acre?

Mr. MIES. We put on about ten loads to the acre, that is, during the entire year. We make about ten loads cover it. It is not good manure, manure and residue. There is a lot of straw to it. We have about one thousand acres in there that has not had any tile; broken up about the same time in the early 50's and it has been farmed exactly the same, because it don't require any tile. Up to the time I went to phosphating and clovering, those people had raised more clover than had been raised on my farm. After I went onto this farm I used more clover than they did and more phosphate. It may be fair to say that I made a fair comparison with my neighbors and if I had known I was going to get into this line of work I would have left check strips.

Q. Was your farm any years without being cropped?

Mr. MIES. My farm has been cropped just as many years as they could. Oats and corn, spring wheat, and then oats and corn. The system of farming was just the same. They farmed every foot of it. They did not have any tile on it. It did not require any, we have none now.

Q. Any manure on this farm?

Mr. MIES. I make enough to cover about twenty acres.

Q. You make no allowance for it?

Mr. MIES. I do not keep as many work horses as they do on their farm. I only run eleven work horses and they run about the same. They have about the same number of cattle; if I make more manure than they—

Q. I mean you are not allowing anything in your increase of the crops for the manure you put on, you attribute it all to the phosphate.

Mr. MIES. No; I said a while ago, the most of it was due to phosphate and clover. I want to say to you from my standpoint, clover is the keynote

of the whole business. You can sell three thousand bushels of corn and two thousand bushels of oats and you can bring back for less than twenty dollars the phosphate you used in that crop. It is simply a commercial proposition. You can buy phosphate but you cannot buy a stand of clover.

Q. Do you buy it in sacks or in bulk?

Mr. MIES. In bulk.

Q. What do you pay?

Mr. MIES. Last year \$6.68 or \$6.70.

Q. How much percentage of that is phosphate?

Mr. MIES. Fourteen per cent.

Q. What is the advantage of buying it in bulk?

Mr. MIES. In sacks it will cost you about one dollar more. Really I think it is easier to handle in bulk than in sacks.

Q. Spread it right from the car?

Mr. MIES. Spread it right from the car.

Q. Would you mix it with hay or straw?

Mr. MIES. It makes an extra handling and I would not do it.

Q. Would it be any better in having it mixed with manure?

Mr. MIES. As I understand you, you want to mix it with manure before putting it on the land?

Q. Is the manure all right itself or is it better mixed with phosphate?

Mr. MIES. Ask Mr. Mann or Dr. Hopkins about that.

Q. I would like to ask about the sheep on that farm. Were they raised or bought?

Mr. MIES. Those sheep were raised on the farm. They simply ate me out of clover. I had nothing to plow under. Being in great need of organic matter and humus, I quit the sheep business until I got more humus and organic matter in the soil. I was simply driven from the sheep business. I also quit the cattle business on account of the lack of organic matter and humus in my soil.

Q. I understand from your discussion you attribute your success in clover primarily to the use of phosphates in clover?

Mr. MIES. Yes.

Q. And you used phosphate to get clover and you got it?

Mr. MIES. Yes.

Q. Did I understand you to say you inoculated clover?

Mr. MIES. Every time I sow red clover I inoculate it.

Q. Do you do that now?

Mr. MIES. I do it now.

Q. What does it cost you—a cent an acre?

Mr. MIES. Five cents' worth of glue into one gallon of water, one quart of this glue water for each bushel of seed and then one or two quarts of pulverized dirt from an old clover field, which I sow on twelve acres. I am not a very heavy sower. I can do it for five cents. [Laughter.]

Q. When do you put on phosphate in your four-year rotation?

Mr. MIES. I have three choices for phosphate. My first choice is to put phosphate on where I have a new stand of clover. Supposing next spring I sow clover, 1916, I get a stand of clover and put phosphate there in the fall of the year. I can increase that to a great extent inside of six months. If I haven't any clover, I could put it on stalk ground where I intend to sow oats and clover, and then you probably get some young clover. Next place is on fall plowing before I plant corn.

Q. Do you think that inoculation where you have not used phosphate is an advantage to your clover?

Mr. MIES. Yes.

Q. Just a minute. There is your farm in 1906, any different arrangements now?

Mr. MIES. Oats and corn, no fence there (indicating). Here is the farm in 1916 (indicating). This I can put into blue grass pasture (indicating). Now, I can get into that field and into that field and into that field and into that field. I have a four-year rotation and any time I want to I can have a five-year rotation. All I have is eighteen acres blue grass

pasture there, on the farm, making a difference in the system of farming, in the rotation, changing it from this kind down to this kind (indicating on chart).

Well, gentlemen, if that is all, I thank you for the attention you have given me. [Applause.]

PRESIDENT TULLOCK. The next is an address by Mr. J. C. Sailor on "What Farmers Can Do By Having an Agricultural Improvement Association and a County Adviser." [Applause.]

WHAT FARMERS CAN DO BY HAVING AN AGRICULTURAL IMPROVEMENT ASSOCIATION AND A COUNTY ADVISER.

(J. C. Sailor.)

MR. CHAIRMAN, LADIES AND GENTLEMEN: I presume that when Mr. McKeene, our secretary, asked me to take a place on this program, he wanted to have some grain farmer who did not have any particular axe to grind with the proposition of forming a county association or providing a county adviser. In fact, we are seeking no job, but when we bring the organized county and adviser to you and we give you a talk along the lines of benefits, you naturally will conclude that this adviser is looking after his job to make better farm conditions.

I wish this afternoon that I might bring to you some definite information from our short experience in Iroquois County with the soil improvement association.

I remember when I was a boy going to school that we had a teacher who was a stickler on making the boys and girls understand every problem that came before them. I remember one time the teacher said to the boys and girls, "If I can give you something definite and you understand everything I bring to you, I have accomplished something." She said to the boys one morning, "I want to give each of you a word to define and I want some definite definition" and among the words that I remember distinctly was this: "Johnnie, define mother hubbard." He said, "A mother hubbard is something that covers everything and touches nothing." [Laughter.] I will not try to cover everything but hope I may touch some of the things.

I wish to go back about thirty years when I begun the farming game. There was no agitation then. I remember when I commenced to farm we did not know anything about the laws of soil fertility. We thought this old soil of ours was so rich we did not need to do anything or pay any attention to it. We thought if a man raised 100 bushels of corn on an acre of land it was all right. If he raised ten bushels it was the same thing. When I commenced farming I thought I should subscribe for some agricultural paper to get something that was going on among the few fellows that understood something about agriculture. I subscribed to the "Practical Farmer" which was published in Philadelphia. One of the writers to that paper was T. B. Terry. Every week he came to us in the paper with his article and he wrote it in such a good way, how to build up a worn out farm, and how to preserve the manures on the farm, and how he and his son went about doing the work, that I took a great interest in his articles. Up to that time I didn't have very much respect for a man that advocated scientific study to be a successful farmer, as I thought it was all well enough for the scientific or agricultural departments to advocate those things because they didn't pay the bill.

There is our extension department, and I place myself in the position of a good many farmers, after reading the bulletins that were sent out by them, and I must admit that the average farmer does not understand the bulletins fully. We must study and learn. As I became more interested in this work and understood it better, I found others taking it up and the messages of value were being more and more accepted among the farmers of every county and township. Then the period of agitation came to us after this period of education for the formation of associations and the selection of an adviser.

I remember a meeting was called and how men from each township came together in our county and how they formed their organization. Then the adviser proposition came up. I remember the day when we went to Urbana to consult with the gentlemen there so we could get some of the things that the other counties were receiving and we found that an adviser must have certain qualifications and we talked among ourselves and thought it was a hold-up game and that the University of Illinois should have taken our man. To-day, gentlemen, I believe the wisdom of their course is manifest. We were successful in securing a man that possibly some in this audience know, L. W. Wise, who is a splendid type of a man for a county adviser.

What qualifications should he have? I believe that an adviser should have first, breeding. I believe he ought to be bred on a farm and that he be in close touch with nature and close to the farmers and in full sympathy with them. I believe he should have the same qualifications that the University requires him to have.

I want to talk about our part of the work in the county. Our adviser has visited within the past eighteen months over two hundred farms and tested their soils and given the treatment and advised as to drainage and as to rotation of crops, the seeding of alfalfa, sweet clover, and the treatment of oats for smut, and making general inspection tours, and so on. Yields in twenty reports show 62.2 bushels per acre of oats not treated and treated oats in eighteen reports show 70.5 bushels per acre. In 1913 there were about 600 acres treated and in 1915 about 15,000 acres treated. In 1913, as near as we can ascertain, about six carloads of rock phosphate were used. In 1915 over thirty carloads of rock phosphate were used. This is the report of our membership and perhaps some loads were used by farmers who don't belong to our association.

In 1913 no lime was used. In 1915 over thirty-five carloads were used. One hundred and sixteen members of our association have alfalfa fields ranging from three to twenty acres each. In 1913 not over 300 acres were in alfalfa and we now know of more than 5,000 acres. We have twenty-seven members with sweet clover fields aggregating 2,500 acres. In agricultural production our county stands third in Illinois and fourth in the United States. With that showing in less than two years, who can say our association has not been an agricultural success.

The reason for better systems is apparent. Most men do things when the course advised is profitable and they can see the things done. This being true, the bringing together of the student and teacher on the personal inspections and training trips is rapidly building the foundation for a permanent system of agriculture, better and more live stock and better farm equipment, better homes and better schools, and last, but not least, better roads.

Iroquois County is on a plane for our citizens to be proud of and the country life in our county has a bright future. If our associations can live until our farmers understand the splendid work being done, we will be satisfied. Sometimes we hear some knocker complain of increased taxes on account of appropriations given by our county board, but surely the manhood is small that would kick on paying fifty cents on a hundred and sixty acre farm. It would only take that much to raise \$2,000 in our county for agricultural research.

I am not in a position to make any further remarks. I am glad to give you some of the things that have been done in our short career. I thank you. [Applause.]

PRESIDENT TULLOCK. This session was planned to set forth the work of the farm improvement associations and we have several of these agents present who have not been heard from yet. Is Mr. Heaton in the room? (Yes.) Please come forward, Mr. Heaton.

MR. E. B. HEATON.

MR. CHAIRMAN, LADIES AND GENTLEMEN: I did not come here with the intention of making an address, but I might say a few words in regard to

my plan of work in Dupage County. Dupage County is entirely a dairy county producing milk for the city of Chicago, and in such a dairy county we find, first of all, good roads, because all must take their milk to the train every morning. When I started out with the work three years ago this spring I had one main object in view after looking the situation over and that was to try and see if it was possible to produce milk cheaper than it was being produced at that time. I found that several hundred thousand dollars each year were being used by the dairymen for the purchase of mill feeds. With that knowledge we made alfalfa growing the primary object of our work. I find that after developing this object that the other lines of work followed on these farms. I find that if you can get a man to reduce feed bills through mill feeds purchased for dairy cows from one-half to two-thirds by the raising of all the alfalfa hay that is needed to feed the cows and young stock during the year, that he is one of the first to develop the other lines of work toward permanent systems of farming which were spoken of by Mr. Oathout.

All of these things have followed in their order. I have made a great many talks and conducted many demonstrations in the last three years along



A morning scene at a milk station.

the line of alfalfa growing and I believe that it has been a work worth while. We have followed out other lines of work but they have all been side lines to the main line of work, the increasing of the amount of alfalfa grown on the farms. Around Chicago the big milk trusts control the milk market and they have been as far as possible reducing the price of milk and in order to make a profit on the dairy farm the dairyman must either reduce the cost of feed or he must in some way bring about an increase in the price of milk. They have a milk producers' association in that section which is doing a good work toward holding up and keeping up prices of milk, but my work has been mainly in trying to reduce the cost of production and we know that we can reduce the cost of mill feed.

You will find many men who for every dollar they get out of their milk are spending almost one dollar for mill feeds and this has been the primary study in my work and will be until we have everyone growing alfalfa.

Q. Have you done much butter making in your section?

Mr. HEATON. None whatever, except locally.

Q. You don't think that is profitable?

Mr. HEATON. We are so near Chicago that we think we can do better in that market with our milk.

Q. Do you sell your heifer calves?



Alfalfa makes the young stock grow.



Knee deep in alfalfa.

Mr. HEATON. That has been one thing that has come about through growing more alfalfa. They are raising more calves and they are finding that they can produce a calf which will make a better cow than they can buy.

Q. Have you investigated to find out whether the butter making would be as profitable as selling the whole milk?

Mr. HEATON. You have an entirely different line of farming because then you have the skim milk for hog raising, which we don't have. I believe it is just as profitable where it is carried on with good methods. Where you sell butter fat you will find that there is a difference of about thirty cents a hundred pounds in milk.

Q. Is it your judgment that you can produce calves successfully on the skimmed milk?

Mr. HEATON. I think so if you have alfalfa, corn and oil meal.

Q. Have you had any success with soybeans?

Mr. HEATON. Not in our section of the country.

Q. Have you tried silage to reduce the cost of production?

Mr. HEATON. Almost everybody has a silo up there. A silo is a great thing but it does not do everything toward the reduction in the cost of milk. You have got to have protein. We can have that most cheaply by using alfalfa and cotton seed meal.

Q. How do you manage to keep the middleman from getting more out of it than the farmer?



Corn-silage and alfalfa hay, the ideal dairy cow feed.

Mr. HEATON. It looks as if the middleman gets the most. In Chicago there are many different retail men in the milk business. Dr. Harding found that a large per cent of the small dealers are losing money. It is the large people like Bordens and Bowmans who make the most profits. The farmer gets 3 1/24 cents a quart as an average.

Q. The year around?

Mr. HEATON. Yes, and the retailer sells it for eight cents but the small retailer is not making much more than the farmer but the large retailers are reaping too large profits.

Q. Have you considered selling this milk through your own agents?

Mr. HEATON. You cannot get the farmers to organize and cooperate, as Mr. Swift, who is here, can tell you, and I am sure he will be glad to tell you all about it. Mr. Swift, is the president of the Chicago Milk Producers' Association.

Q. Do you pasture alfalfa?

Mr. HEATON. Not very much. We don't pasture very much anyway in that section as we keep the cattle in the yards mostly.

Q. You get about \$1.50 a hundred for the milk, don't you?

Mr. HEATON. That is about the year around price.

Q. How do you cure your alfalfa?

Mr. HEATON. We use the side-delivery rake, and the hay loader. You can make alfalfa very good in this way. Alfalfa is easy to cure and easier than any other hay we have on the farm. We have men that have as high as 250 acres of alfalfa on the farm.

Q. A silo is about the most profitable investment you can make on the farm, isn't it?

Mr. HEATON. I think so.

Q. How do you keep silage over in the summer?

Mr. HEATON. Most of our dairymen have a summer silo that they use during the summer time.

Q. What is the popular sized silo?

Mr. HEATON. All sizes. It depends largely upon the number of cows. You must have a silo commensurate with your number of cows.

Q. How many inches of the ensilage do you recommend feeding off every day?

Mr. HEATON. Six or seven inches is plenty and sometimes you can get along with less.

If there are no more questions, I thank you. [Applause.]

PRESIDENT TULLOCK. We would like to hear from Mr. Brooks, county agent from La Salle County.

MR. BROOKS.

MR. CHAIRMAN AND GENTLEMEN: As Mr. Heaton said, I did not come here to make a speech, but your discussion of the county agent question interests me. I am in that work and it interests my people in La Salle County.

The county agent cannot do everything, but his position may be illustrated by the story of two fellows who heard a barking dog around the house. One said to his friend who was somewhat alarmed, "A barking dog will not bite." "Yes," the friend answered, "the one we hear may not bite, but he may stir up one that will. [Laughter.] The county agent cannot do one-tenth of these things which we have been discussing, but he may stir up enough interest to induce others to do many of them. The number of things which may be accomplished is astonishing. The agent can do only a small part of it. His great task is to start people who will enjoy doing them.

One thing which comes to mind is a proposition that was put up to a Government man a short time ago. There has been more or less said about purchasing seeds and different supplies, and that people who are on public salaries should not do that kind of work. One of the associations put it up to the Government, whether they would be permitted to organize for profit, and the Government answered "certainly." That seems to me to mean a great deal. The Government is now cooperating with railroad companies, and mining companies in helping to hire men who are doing educational, investigational or advisory work, just as it is with these county associations. The big part of this movement is the farmers' organizations. You are getting together, and because of this you can undertake any kind of a job you desire. The question of the building up of our soil fertility is one of the things for the farmers' associations. We are working now very close to greater things which few of us realize. On the 15th of March there will be a meeting in Ottawa to organize a State association of these county organizations. It has not been called by the county men, but by the farmers, officers, of the county organizations.

A great many have felt the need of closer organization among farmers. We have had some organizations for special purposes, and when these purposes were accomplished the organizations dropped by the wayside. This State association is to be organized to take up every day affairs which are of vital importance to members, and it means great things for the farmers.

It is estimated to be a great movement for the betterment of agriculture and for the citizenship of the State of Illinois. [Applause.]

PRESIDENT TULLOCK. Many counties have formed farm improvement associations. We have with us this afternoon one of the men who was largely instrumental in organizing one of the first associations formed in the State of Illinois. I will introduce to you Mr. H. H. Parke of Dekalb County, Illinois.

Mr. H. H. PARKE.

MR. CHAIRMAN AND GENTLEMEN: We have had a long afternoon, there are others to talk, I have left my paper at home, so I assure you my talk will be short.

I have been asked by several to discuss the method of organization of a county agricultural improvement association. I can do no better for a minute or two than to describe the movement as organized in Dekalb County.

This movement was distinctly a banker-farmer movement. The bankers were as much interested in it as the farmers. We had a bankers' association in Dekalb County and also had an editors' association and a good farmers' institute organization. A large number of farmers' club meetings were held at which this county expert movement was discussed. The bankers had discussed it at their meetings and the editors had a discussion at their meetings. We then held a union meeting with several prominent speakers to discuss the value of this movement. There were appointed township committees to take subscriptions in the several townships of the county. A committee of three from each township was appointed. We also elected directors at this meeting, a directorship consisting of three members from the bankers' association, three from the editors' association and three from the farmers' institute. This constituted the executive committee of the Dekalb County Soil Improvement Association. I might mention the fact that a director was appointed in each township in the county. The bankers appointed a committee to meet the bankers and secure subscriptions from them. Nineteen out of twenty-one banks gave \$100 each in support of this association. About \$6,000 was subscribed by over 700 farmers in the county. The board of supervisors gave \$2,000 to start this movement and they are now giving \$5,000. We also get \$1,200 from the State and Federal Government.

I think that is practically all I can say on the question of organization that will be of much value here. I have since watched the growth and development of these associations throughout the State and have been highly pleased with the results.

I have met nearly every one of the county advisers on my own farm and I think, in fact, I know, that Illinois is to be congratulated on the high standard of these advisers, a higher standard than that of any other State. I sincerely hope that this standard will not be lowered when the rest of the counties organize.

This standard will be a measure of the stability and growth of these organizations throughout this State.

A few words concerning the results we have secured in our county. I can best illustrate the results of this movement in Dekalb County during the last three years by telling you what has been accomplished in my own neighborhood, along a road eight miles in length between the towns of Sycamore and Genoa. There are twenty-five farms on this road. All these results cannot be attributed directly to the county adviser's work. The agricultural press and the farmers' institute have helped a great deal.

All but one of these twenty-five farmers are members of the Dekalb County Soil Improvement Association. Three years ago there was but 25 acres of alfalfa on this road. To-day there are 450 acres of alfalfa. Three years ago but one-eighth of these farms were in clover. To-day one-fourth of all those farms are in clover or alfalfa. Three years ago there were but three silos upon this road. To-day there are sixteen silos.

Ensilage and alfalfa, as you know, are good for live stock. There is fifty per cent more live stock fed on these farms than there was three

years ago. Two of the farmers treated their oats for smut three years ago and this year but one failed to treat. The money saved by these 24 farmers in treating their oats pays more than one-half the cost of running the soil improvement association for one year.

Another thing I want to mention is, that there is not a field of timothy on this road. Alfalfa and clover have driven out timothy. Last year I noticed that 15 of the 25 farmers were putting up permanent improvements on their farms, hog houses, corn cribs, concrete construction of various kinds, barns, and in one case a house. All but five of these farmers planted the best variety of seed corn best adapted to that section, and this year all of these farmers will have the opportunity of sowing the best variety of oats known to this section. All of these farmers have purchased clover and alfalfa seed selected by a seed expert, seed that is absolutely free from injurious weeds and seed of the highest quality, seed whose source is known.



Seed-corn and clover seed in the seed-house of the Dekalb County Soil Improvement Association, Dekalb, Ill.

I have another little illustration that shows the change in our farming. Mr. McDole of the Elva Station said that three years ago out of 50 carloads of hay he sold that 45 of them were timothy and five clover. Last year this same man sold 45 loads of clover to only five loads of timothy. The thing had been reversed.

The farmers on this road that I am speaking of are now discussing consolidated schools and good roads. I am sure that when these questions come up to a vote you will find these farmers working shoulder to shoulder.

I dislike to measure the value of this work in dollars and cents, but I do know this, that no money has been invested by the farmers of our section and by our board of supervisors and by the bankers and merchants that has brought back such large returns as the money invested in the

county expert movement. If there are any questions I will be glad to answer them before leaving.

PRESIDENT TULLOCK. Don't hesitate to ask Mr. Parke any questions as he knows all about it.

Q. What per cent of the farmers chipped in to pay the first expense?

Mr. PARKE. There are about 2,400 farmers in the county and the subscription list represented of that number about 700 farmers.

Q. What did you do with all the money that you got the first year?

Mr. PARKE. We spent it judiciously. [Laughter.]

Mr. J. P. MASON. Those who were not members and are not members, will the adviser serve them just the same as he does the others?

Mr. PARKE. Exactly the same.

Q. What is your annual income for the association?

A. About \$7,500.

Q. How much of the \$7,500 do you spend each year?

Mr. PARKE. All of it and sometimes more.

Q. Where did you get most of your clover seed this year?

Mr. PARKE. I could not tell you that. Wherever we could get seed of the highest quality, free from weed seeds and adapted to this section.

Q. Your association has a seed house of its own, has it not?

Mr. PARKE. Yes.

Q. Does your association do anything in the way of selling farm products?

Mr. PARKE. It assists the farmers in finding a market for their products.

Q. Does that bring about any friction between your merchants and the farmers?

Mr. PARKE. It has not thus far. I remember one elevator man when we were encouraging the growth of clover by furnishing seed at cost said that he had sold four times as much clover seed as he ever sold before.

Q. Do you think a county organization ought to handle fencing, posts and such things as that?

Mr. PARKE. I could not answer that.

Q. What is your policy as to that?

Mr. PARKE. We have not done it so far.

Q. Why not?

Mr. PARKE. We have had too much other work on hand. We would have to hire another man if we took up that work.

Q. Are your business men contributing to the support of your movement?

Mr. PARKE. Not many of them. We had sufficient funds without bothering our business men. The manufacturers have helped.

Q. What was the question?

Mr. PARKE. The question was, how much support did we get from the business men? We have had sufficient funds without bothering the business men and if we did not, we surely would have gone after them.

Q. Are the bankers still contributing?

Mr. PARKE. The bankers are contributing to this association as members of the association.

Q. What are your membership fees?

Mr. PARKE. Two dollars and fifty cents per year.

Q. Is that \$2.50 per year?

Mr. PARKE. Yes.

Q. Is your county board still assisting?

Mr. PARKE. They appropriate \$5,000 a year.

Q. How do you work them?

Mr. PARKE. We have always encouraged the attendance of the board of supervisors at the farmers' institute meetings and these institutes are held every once in a while.

Q. What per cent of your farms have been analyzed?

Mr. PARKE. I think he has resorted to our soil map. I know that he has examined soil on 300 farms per year and advised the farmers what kind of soil they have and also what to do with it.

Q. What kind of good roads does he advocate?

Mr. PARKE. Those advocated by the Illinois Highway Commission.

Q. Does your adviser confine his attention only to members of the association?

Mr. PARKE. No, sir.

Q. How do you get your supervisors to the institute meetings?

Mr. PARKE. Drag them in. [Laughter.] I want to answer the other question a little further. Nonmembers are given the same attention as members if they desire it. Of course we want to get them all in.

Q. What salary does your adviser get?

Mr. PARKE. Four thousand dollars a year.

Q. Your county puts up \$5,000 and your county pays more than your membership?

Mr. PARKE. Yes, it does.

Q. What advantage comes by paying \$2.50, from being a \$2.50 man from the general taxpayer?

Mr. PARKE. Merely a philanthropic man. The burden always falls upon a few no matter what you do.

Q. When a county adviser buys seed, does he get any guarantee as to the germinating quality of that seed; does he buy on a special agreement guaranteeing the germinating features?

Mr. PARKE. He does not buy seed that is not of the highest quality. He is assured of its vitality before the seed is purchased.

Q. We have an adviser who buys a great deal of seed for Dupage County and everyone speaks well of the seed bought by Mr. Eckhardt.

Mr. PARKE. This year a carload of alfalfa seed was purchased from Idaho. This was purchased of the farmers but the seed passed through the Government Experiment Station and had the stamp of approval of the superintendent of this station. We cooperated with the farmers through their government station.

Q. How many assistants has Mr. Eckhardt?

Mr. PARKE. He has a stenographer and a seed expert.

Q. How has the association affected the Farmers' Institute; has it helped it or injured it?

Mr. PARKE. Our attendance this year in eight meetings was about the same as it has always been. I noticed much more interest at the meetings and more intelligent questions were asked than have been asked in former years. You can see a marked change in interest and intelligence.

Q. Have you adopted any standard variety of seed corn to any extent?

Mr. PARKE. We have been endeavoring to buy that highest yielding variety which has produced from 2 to 19 bushels more than its highest competitor for the last eight years; and the other variety is an earlier variety, but I cannot give you the record of that.

Q. What kind of oats were those you spoke of?

Mr. PARKE. Oats of late variety and perhaps Mr. Oathout can answer that better than I can.

Mr. OATHOUT. No, I can't answer that.

Mr. PARKE. It is known as the American Banner oats and the Great American. We are putting out 10,000 bushels of this variety.

Q. Do you give any special attention to the diseases of live stock, such as hog cholera?

Mr. PARKE. Mr. Eckhardt is lending all the assistance possible in stamping out hog cholera.

Mr. SWIFT. Why do you discriminate against timothy when you are so near the Chicago market that will take every ton of good timothy hay you can raise and pay \$6 a ton more for it than for clover hay? In other words, why not raise more timothy hay to supply the market in Chicago just the same as you raise corn, wheat and oats to supply a demand and why do you go to alfalfa and ensilage to feed to a lot of dairy cows that will

not bring for their milk in Chicago more than 2½ cents a quart? What is the reason of the system you are outlining in DeKalb County?

Mr. PARKE. As regards timothy, we feel that timothy is as hard on the ground as corn and it provides a harbor for insects that injure the corn. Three years ago I saw a 17 acre field of timothy sod corn that was not worth husking and there were many such fields in DeKalb County. Now, what was the other question?

Mr. SWIFT. The other question is, why in the system you are outlining in your county, taking that road on which you live, why are they putting in a silo and alfalfa, unless it is that you are doing it to feed it to dairy cattle whose milk only sells for 2½ cents a quart?

Mr. PARKE. A large amount of this silage goes to feeding sheep and beef cattle. There are but one or two dairies on this road.

Mr. SWIFT. I congratulate you. [Laughter.]

Q. In what way does your agent seek to increase your interest in live stock?

Mr. PARKE. In an advisory way, the same as he does everything else. It is also done through institute meetings when we hold them.

Q. Do you have township organizations?

Mr. PARKE. Not exactly so. We have a large number of farmers' clubs that correspond almost to townships.

Q. What was the objection to the one farmer not coming into the association?

Mr. PARKE. I don't know as he has an objection but he has not come across, but he will, I think, later on. He is looking over the fence just now.

Q. It is probably the case that that man's father was not a member of an association and his grandfather was never a member and therefore he is not a member?

Mr. PARKE. I think so. [Laughter.]

Q. Did I understand you to say that you had a seed expert?

Mr. PARKE. Yes, we hired Mr. Gault who has had charge of many of the experiment fields in this State and who is a seed expert.

Q. Tell us all about it and what it costs?

Mr. PARKE. We pay him \$1,800 a year to handle that work.

Q. The seed house belongs to the association?

Mr. PARKE. Yes, sir.

Q. He buys and sells seed for you?

Mr. PARKE. Yes, sir.

Q. He manages your seed corn business?

Mr. PARKE. Yes; he also manages all the seed we handle.

Q. Do you make enough on your seed to pay his salary?

Mr. PARKE. We aim to.

Q. Does this silage make your sheep sick?

Mr. PARKE. I am not a sheepman.

Q. There is a man claimed that silage made the sheep sick and breeding ewes lose their lambs.

Mr. PARKE. I don't feed sheep and therefore I don't know, but I do know that those who have fed silage continuously are feeding silage successfully.

Mr. RALPH ALLEN. Do you know if other county organizations operate the same as you do in serving everyone in the county just the same as though they were members of your organization?

Mr. PARKE. I think they should do that.

Mr. RALPH ALLEN. Do you know that other counties do besides DeKalb?

Mr. PARKE. I think Winnebago and Kane Counties do and I believe that Dupage County does, and I don't know but one or two that don't and I could not name them just at this moment.

Q. There are some of the counties where the county board does not contribute any of the money at all and where all of the money is contributed by membership fees. In most of those counties the visits of the adviser is confined to the members because they have shown enough interest

in the work to support it. Any man in the county has the liberty to consult with the adviser and attend any of the meetings even in those counties where it is supported by the membership with the exception of the \$1,200. There are probably five counties in this State that are on that basis entirely.

How much money is required to carry this association through the year?

Mr. PARKE. I think about \$7,500.

Q. I think most of these associations have a purchasing committee which consists simply of the members of the association and whatever they purchase they simply purchase for members of the association?

Mr. PARKE. Yes sir.

Q. In our county no rock phosphate is purchased for anybody except members of the association?

Mr. PARKE. Yes—

Q. The tested clover seed and alfalfa seed they purchase is only for members of the association?

Mr. PARKE. For any farmer in the county.

PRESIDENT TULLOCK. Some one said they wanted to hear from Mr. Swift. [Applause.] We will now hear from him.

MR. R. B. SWIFT.

MR. CHAIRMAN AND GENTLEMEN: I have seen the time I would have been glad to have had this opportunity to speak to you, but to-day my voice is in very bad shape.

I have addressed a number of meetings of the Milk Producers' Association in Northern Illinois during the last three weeks, and am filled with enthusiasm for the mission I had been asked to perform as president of that association, in endeavoring to do something to better the conditions of the man who is making milk. In some instances I found the apathy so great that I yelled loudly and long and have cracked my voice and it hasn't done much good either, I fear.

I am the director of the Farmers' Institute for the Tenth Congressional District in the northern end of the State. I have believed for years that the man on the farm was not getting a proper return for his labor. It has been the one thought that has dominated my mind that the conditions of the man on the farm were intolerable, and we men on the farm in the winter time can sometimes have a little time to think clearly of the problems that confront us and what we are facing. Thinking about these things, I have gone to the Farmers' Institute and talked this one idea, viz: That the man on the farm was underpaid. I have a good farm and it is well tiled and drained, as I helped dig a lot of the ditches and put in the tile myself. It is a producing farm and I helped make it a producing farm. It grows two ears of corn where it formerly grew but one.

I am thankful to the Agricultural Department of this State for the help it has given me, but I have no thanks for the Agricultural Department of the United States or for the twenty million dollars a year it is spending. The fifteen million people it is employing have taught me little because it has not told the story of our farmers and our farm conditions as I see our farms and farm conditions.

Dr. Hopkins has more nearly told these conditions so far as our soil is concerned and I have followed phosphate, lime and manure, and I have been helped.

Some years ago I went to an institute in the southern part of the State and talked, being filled full of the idea that the cow on the farm was essential to our soil preservation. The best farm I know of is a farm on which there has been nothing but manure for seventy-five years. I am making a lot of manure, but I am buying limestone and rock phosphate each year and I am trying to run a system of agriculture such as you people have spoken about to-day and I believe that I am doing well. It has not made me any money over what my neighboring farmers have done with manure, but sometime I hope it will.

The real question is whether the cow and her manure are essential. Can we maintain our soils without manure? If so, we will have to quit milking unless we can get more for our milk.

When I say that I have made two blades of grass grow where only one grew before, I find that this mere increase in crops has done me little good. Have you thought about that? Have you thought that the two blades of grass are doing you little good? The problem I have in mind is to make two dollars grow where only one grew before. [Applause.]

I can raise good crops. If there is anybody in my county who can raise any better crops, I want to see him. If there is anybody that can get any more alfalfa or corn out of land than I can, I want to see him. But, the problem is to take these crops and convert them into money by feeding them to hogs, horses and cattle. Hog cholera has just cleaned me out of seventy-five hogs and their carcasses have been drawn out into the woods and burned. We have been under strict quarantine for hoof and mouth disease for sixteen months and we could not sell anything. I could not get my stock to market unless I swore that it did not come out of infected territory. I might have asked one of my men to make the oath, but I could not make it myself. [Laughter.]

It was the knowledge of my belief that we must have a better price for our dairy products that led the boys in Northern Illinois to elect me president of the Milk Producers' Association. Twelve thousand men are making milk for the city of Chicago with a capital invested of 250 millions of dollars and with the labor of more than 36,000 men, while the men selling it in the cities and all those employed in all the milk condensing and bottling plants in the country surrounding Chicago do not number more than 4,000, and haven't capital invested to exceed 25 million dollars. In other words, we produce milk with ten times the capital and men and get for it but three cents per quart out of the eight cents for which it is sold in Chicago.

We, an intelligent body of farmers, living on land more productive than any upon which the sun shines in all the world, egotistically think we are the brains, brawn and sinew of the world, and yet, when we could by cooperation increase the price of milk to four cents a quart as easily as you could step one foot ahead of the other, we will not organize and pay small dues, will not attend meetings or do anything to aid in defeating the milk trust that is opposing us and keeping the price of milk below its cost of production. Just what is the matter with us? What is the trouble? Sometimes I think the ownership of a little property makes us cowards. Just consider the different make-up of the carpenter, the mason or plumber. With a dollar and half in his pocket only to keep his family from starvation, these trades workers will walk into union headquarters and lay that dollar and a half down and join the union and advise the contractor that he will not work for less than 65 cents an hour, even though he knows that his wife and family will want for bread that night. But we farmers that can live, and live whatever the world may choose to do or undertake to do with us, will not do one blessed thing to increase the prices of our products, but on the contrary will surreptitiously slip in to get the first contract so our milk may be sold and our neighbor's milk stay unsold.

I would like to talk to you just a moment as to what it costs to make milk. The average cow does not produce 6,000 pounds of 3.5 per cent milk yearly. The cow that milks 6,000 pounds of 3.5 per cent milk requires three tons of alfalfa hay or its equivalent, and this is worth the way the market is to-day \$15 a ton, thus making \$45. She cannot be fed on anything cheaper than six tons of silage worth \$5 a ton, \$30. Besides these roughage feeds, she requires concentrated feed that is worth \$25. That makes \$100. You are feeding \$100 worth of feed besides caring for the cow for 6,000 pounds of milk or 3,000 quarts that will sell for three cents a quart, amounting to \$75.

You say that to go on in this way is impossible. It is not impossible at all. Our dairymen will do it and go to the cow stables at four o'clock in the morning and work all day and then milk the cows after supper. If they worked alone we would not care so much, but they take their wives and

children with them into the fields and stables. The final result of such a course is the bankrupt court and sheriff's sale. More dairy herds have been forced under the hammer during the past six months than for many years.

There is an act pending in Congress which provides that any product made by child labor cannot be transported between the states. I spoke to dairymen in Belvidere yesterday and the manager of the largest milk plant there came into the meeting. Dairymen seeing him feared to come in. I reminded him that two could play at the game of intimidation and that if his employers were not careful we would put an obstacle in their way that they could not get over, in a law that would prevent their shipping of milk across the border of our State because of the child labor used on our farms.

A price below the cost of production is a serious condition; serious because it has a tendency to place our agriculture on the downgrade toward poorer land, poorer homes, children dwarfed and stunted, and poorer living conditions. I trust it will never reach European conditions where a man upon English farm labors for a pound a week and supports himself and his family. It is against intolerable conditions that the Milk Producers' Association will labor. It will first advocate a revolt and urge that all milk be kept at home and fed to the calves and pigs or made into cheese and butter unless nearer a living price be offered us for our product. Can we win against organized millions? Only a fight to the finish will determine that and I am ready for my part in the revolution. [Applause.]

PRESIDENT TULLOCK. This will conclude our afternoon program and we will now adjourn.

EVENING SESSION.

Tuesday, February 22, 1916, 7.30 o'Clock.

PRESIDENT TULLOCK. On this occasion, the twenty-first annual meeting of the Illinois Farmers' Institute, it is incumbent on me, as its representative, to set forth, briefly, the aims and activities of that "Corporate Body" of the State.

Since the Illinois Farmers' Institute came into being, by act of the Thirty-ninth General Assembly, whose purpose it should be "to assist and encourage useful information among the farmers, and to develop the agricultural resources of the State," it has been, and is, an active factor in extending scientific and practical knowledge throughout the farming regions of the State. It has been the aim of the Institute to cooperate as closely as possible with all other agencies, whose object is progress along similar lines. To that end, the Institute has served, to a certain degree, as a medium of publicity for our College of Agriculture. The findings of the experiment station has been given from the Institute platform by University men, teachers, graduates and practical farmers who have adopted their recommendations.

Kindred organizations, such as the Dairymen's Association, the Horticultural Society, the Poultrymen's Association, Horse Breeders, Cattle Feeders, and all other live stock associations have been drawn upon for speakers that their representatives might set forth the results of investigations along their special lines. The State Board of Agriculture, and the various State commissions, have most willingly cooperated with the Farmers' Institute and have given publicity to their work through that medium.

Household science speakers from the University and from this multitude of women's clubs that have been built up over the State by the efforts of that department of the Farmers' Institute, have all furnished their quota of speakers to aid in building up "Better health, better homes, and better schools in Illinois."

It is the mission of the Farmers' Institute to seek practical and useful information from whatever source it can be obtained. In the words of Frank I. Mann, "The highest motive of the Farmers' Institute is to extend scientific information until it has become common knowledge. We believe

that any method of stimulating a soil for increased production is a crime, and should be treated as such. We welcome the efforts of all forces prompted by a desire to extend true scientific agricultural information with a motive to establish permanent agriculture, and with all such forces the Illinois Farmers' Institute will heartily cooperate."

The doctrine of limestone, phosphate and clover has been preached from the Institute platform in village and hamlet, church and schoolhouse until the wonderful story is becoming common knowledge, and on every hand we see evidences that the trend of agricultural efficiency is upward.

The Farmers' Institute does not claim the entire credit for this movement, but we do believe that it has been a useful agency in this great agricultural uplift that has been going on.

In a measure, the work of the Farmers' Institute is limited by the number of people that can be reached, by the number of people that can avail themselves of the opportunity of hearing the discussions and being present at the meetings.

Too often the officials of the Institute bring high authorities to discuss various phases of the farming business, only to find that the "man behind the plow," the tenant, or the man in moderate circumstances is not there to get the benefit he ought to receive, because of the impassability of the roads, or because of the pressure of other business, or perhaps, because of lack of interest.

This is one of the big problems of the Institute. However, I believe it is being solved. As an outgrowth of the Institute idea, many counties have formed farm improvement associations whose agents are constantly at work, visiting remote and inaccessible parts of the counties as well as the well traveled highways. And in their wake follows discussion, criticism, demonstration, and finally belief.

I would bespeak the closest cooperation between the Institute and county farm improvement associations. Another agency is the minister of the country church. Many a pastor has builded better than he knew, because when he preached the Gospel of Christ, he also preached the gospel of "limestone, phosphate, and clover." It was a good suggestion that every minister who is to take a country charge, should take a course in agriculture, and then they should go out among the people and learn the problems of the community and be able to discuss them intelligently.

What does this mean to the State of Illinois? It means that we are just beginning to have a conception of the possibilities of the agricultural resources of our State.

It means that eventually land values instead of being largely speculative, as they have been in the past, will be based on the actual producing capacity of the land, which in itself will be a powerful incentive to good farming.

In no state in the Union is agriculture more truly the basis and foundation of general prosperity than in our own. The heaviest demand the future will make on us is for the product of our farms. Not our own people alone, but others will constantly draw upon our farm resources for sustenance, and much of the comfort and well-being of our citizens depends on how well we husband our farm resources. To eliminate the enormous waste and to develop the full capacity of the farm, are the important tasks for the accomplishment of which we may profitably exert our energies. Increase in farm products means prosperity for the farmer, and reasonable cost to the consumer, two highly desirable results.

We are entering upon an era of wonderful opportunity, the next ten years bids fair to be the golden decade of American agriculture. The world is hungry and is asking the American farmer for food. We should employ every agency consistent with the modern conception of permanent agriculture and exert all our energy to increase the output of our fields, that we may feed the hungry millions, and enrich our nation, our families and ourselves.

Happy will be the future of that man, who has the knowledge to embrace to the fullest extent, the possibilities open to the progressive American

farmer of to-day. There are problems other than those dealing directly with the soil that are being hastened toward a solution through the medium of the Farmers' Institute.

GOOD ROADS FOR ILLINOIS.

I will venture to say there is no subject connected with rural affairs that is receiving as much attention and discussion at the Institute meetings this year as is the question of better roads for Illinois.

It is of importance because of its bearing on all other economic problems of rural life betterment. Good roads is the biggest issue before the people of Illinois to-day, and it is just as much an issue for the citizen of Chicago or Cairo as it is for the farmer living twenty miles or more from market. Good roads are a powerful factor in promoting better farm conditions. They reduce the time and cost of transportation. They make the farmer more independent of seasonal and weather conditions, and permit him to take better advantage of markets and prices.

They increase the value of his farm and so enhance his material wealth.

They promote better agricultural methods, and are necessary for an efficient rural delivery and parcels post.

They have a profound effect on our country schools, and home life on the farm. The absence of good roads is the main factor in delaying the formation of consolidated school districts and country high schools.

Many a community is ready and willing to build consolidated and high schools, but is deterred because of the cost of transportation of pupils over the bad roads. Back of the whole country school problem looms the road question. You can't have better schools without better roads. Better roads must be secured before consolidation is possible. Can we afford to neglect the education of the country boy or the country girl, while we quibble over the kind of a road we are going to build, or how it shall be financed? Or shall we send them away to the city to be educated, educated perhaps, in a way that will unfit them for farm life, or where the lure of the city will be so strong, or the air of professionalism may be so complete that farm life ceases to be attractive?

Let us hasten the day when we will have a system of good roads all over the State.

FARM TENANCY.

There is another problem to owners of farms that is looming up big on the horizon. The importance of this subject of farm tenancy is indicated by the fact that approximately fifty per cent of Illinois farms are rented. It is generally conceded that the average rented farm is decreasing in fertility, and value of improvements much more rapidly than is the farm which is tilled by its owner. This being true, a continuation of our present system of leasing must seriously hinder the agricultural development of the State.

A rise in the price of land and an increase in the size of the farm business are two reasons for an increase in tenant farms. When land rises in price so rapidly that the rent does not easily pay a mortgage rate of interest, it is a question whether a tenant should attempt to buy land and pay the large rate, or remain a tenant until the two rates are more nearly equal.

An increase in tenancy is generally associated with an increase in poverty, whereas actual conditions may point to an increase in wealth. While the ideal tenure is each man tilling his own soil, the incentive that pride of ownership gives to industry is often not so important as the promise of larger returns on rented land.

There are various causes for increase in farm tenancy, but the principal one is speculation in land. Owners continue to hold land for an increase in price regardless of the low rental value. It is not an uncommon occurrence for land to pay less than three per cent on the investment and within a year or two advance twenty per cent on price. This is not a healthy, normal condition and should not continue.

If land were owned as a home and not as a speculative investment, the market prices of land would more nearly equal its productive value and

the mortgage rate of interest. The value of land would depend on its annual producing power rather than on its probable advance in price. Land would be valued according to the capitalization of its rent and would be low enough in price to enable the farmer to pay for it from the annual earnings of the land.

At the present price of land, tenants and landlords will be compelled to look more and more to good farm management for fair values on the investment. Farms cannot be managed with any success and be operated by year to year tenants and short-time speculators. Tenants must be assured that they can remain more than one year if satisfactory to both parties and land must be regarded as a home or long-time investment. Landlords must cooperate with tenants in planning and putting into practice a system of cropping that will not only maintain, but increase fertility.

Long tenure cannot be expected unless such a system is practiced. Landlords and tenants become dissatisfied when yields decline. The rent decreases and the price of land declines. The tenant gets less for the same capital and labor he uses per acre and refuses to pay the rent. The tenant accuses the landlord of having infertile land, and the landlord censures the tenant for his poor farming. Without cooperation little can be accomplished toward improving the farm. With the cash rental method landlords and tenants are on opposite sides of a business deal, and there is little inclination for them to cooperate. The lease for cash landlord usually demands all the rent that he can make a tenant pay and then too often does no more in the way of improvements than he is compelled to. The tenant seeks to protect himself by "skimming" every dollar off of the farm he can during his term of lease. The result is strained relation during the term of the lease and at its termination, a farm a little more run down, a depleted soil, and dilapidated buildings.

Therefore, with the object of aiding in checking further depletion of the soil, it is incumbent on the nonoperating land owners of the State, that they make an individual and organized effort to introduce cooperative systems of leasing, because it encourages a more profitable type of farming and maintains the fertility of the soil.

A modified form of stock share renting seems admirable for average Illinois conditions. Too often the landlord and tenant work against each other rather than for each other. Stock share renting serves to break down this barrier and replace it with cooperative effort. The income from the farm business is shared equally and the advance of the interests of the one means the prosperity of the other. The common interest promotes fellowship and confidence and the farm business is not only profitable, but pleasurable.

The rapid increase of tenant farmers and the tendency to abandon agriculture and seek the larger centers of population has become a National menace in this country. It increases the cost of living and causes a one-sided development.

Most nations of Europe are already offering direct and other inducements to persuade the people back to the land. Many bills for the establishment of a rural credit system have been introduced in our National Congress, whereby men in moderate circumstances may become owners of land. Farmland banks and farmland loan bureaus are in the air, and it is more than likely that Congress will soon pass some legislation to that effect.

But it is my belief that, to the Illinois farmer at least, who makes use of the opportunities now available for acquiring a proper knowledge of agriculture, and is willing to work, to put the same push and energy into the farm business that is necessary to succeed in any other business, the door of opportunity swings wide to success. After all, success in the farming business, as in any other business, depends on the man. Without good judgment and common sense, there is not much chance for success, no matter what the other qualifications may be.

Without that faculty, otherwise called "business ability," capital, credit, industry, and even a thorough knowledge of the most approved scientific methods of agriculture, all will be of little avail. To qualify as a business

farmer, a man must have that peculiar form of "gumption" which enables him to shape his work and change his plans according to changing weather, shifting markets, and up and down business conditions.

I am optimistic about the future of American agriculture. More hopeful agencies are operating in rural life to-day than ever before in the history of our Nation. In the higher endeavor of strengthening the foundations of National life and the prosperity of our people, the Farmers' Institute will be found cordially cooperating with its other great allies constituted by the State, in laboring for the betterment of the condition of the masses. [Applause.]

PRESIDENT TULLOCK. This afternoon we were compelled to omit one feature of our program, and we will have it the first thing this evening, and that will be an address by Frank C. Grannis on "Three Years of County Agent Work in Will County." Mr. Grannis is one of the county agents in this State who are doing things and accomplishing wonders. I am pleased to introduce Mr. Grannis. [Applause.]

THREE YEARS OF COUNTY AGENT WORK IN WILL COUNTY.

(Frank C. Grannis.)

MR. PRESIDENT, LADIES AND GENTLEMEN: You have listened this afternoon to five talks dealing with county agent work and it seems to me that subject has been pretty well covered.

I am sure that the Illinois Association of County Agriculturists feels highly honored at being invited to participate in this program. This recognition by the Illinois Farmers' Institute means that county agent work in Illinois has at least passed the first stage of probation and has become one of the really important factors in Illinois agriculture. That it already occupies a high place in agricultural circles is attested by the fact that twenty leading counties of Illinois now employ agricultural advisers and several more counties are ready to begin work as soon as duly qualified men can be found. Every county in the State has either renewed its contract with the agricultural adviser, or plans to do so at its expiration. This, in itself, signifies *permanency* for county agent work in Illinois.

This actual contact with the real problems of the farm is doing more to put the findings of our State Experiment Station into actual practice than almost any other factor. The Farmers' Institute, the agricultural short course and the bulletins have done much to disseminate agricultural information, but it takes the "bulletin with boots on" to set this information to work on the farm.

After the work in Dekalb and Kankakee Counties had been in progress about a year, some of the leading farmers in Will County decided to organize and employ an agricultural adviser. A meeting for this purpose was held during our county institute in January, 1913, at which an organization, known as the Will County Soil and Crop Improvement Association, was formed. The work was so new at that time that only seventy-eight members were secured and with the hope that later more members would be secured, they decided to employ an adviser without further delay, so that in April of the same year, I began work in Will County. There was no blazed trail to follow, either for the association or for its agent, so that both of us had to blunder along as best we could for the first year. During this period, our principal project was that of soil improvement. Our land is valued at from \$175 to \$250 per acre, and our average production of corn is 39 bushels and of oats 35 bushels. Will County's rotation is "oats and corn and corn and oats" with an occasional shift to timothy to "rest the land." Our farmers have had so much difficulty in securing stands of clover that very little clover was being seeded. Although ours is a limestone county, I do not know of a single farm where limestone had been applied previous to the organization of our farm bureau, and only a car or two of rock phosphate had come into the county previous to this. Evidently some of the phosphate received had been of very low grade, because in some cases it has failed absolutely to give results and there seemed to be a county-wide prejudice against it. Alfalfa

had been tried numerous times, practically always without success, and the general opinion was that neither alfalfa nor clover were adapted to Will County soils. In other words, our farmers were "from Missouri" and had to be shown that it was possible to treat land so that it would grow clover and alfalfa and so that it would yield more profitable crops. We were losing thousands of dollars annually through smut in oats, yet when the formaldehyde treatment was first advocated it met with ridicule and suspicion. We were growing varieties of both corn and oats absolutely unsuited to our conditions. On every farm was the remains of what might have been a profitable orchard, which through neglect had been almost ruined. Nothing had been done in a practical way to help the woman on the farm, nor to interest the farm boy and girl in things agricultural. There was no means of distribution for our farm products. Farmers having seed or stock of unusual quality to dispose of had no market for it outside of the usual channels. There was no organized buying done except in a small way through local granges. Farmers bought seeds, fertilizers, and other necessities indiscriminately and usually paid a high price for poor quality. There was no organized means for obtaining farm labor, and the labor question was an extremely serious one. These, and many other problems, presented themselves to the extremely "green" county agent when he began work in Will County in 1913. Added to this was the difficulty of finding the roads to the farms of the various members and of learning to keep a second-hand "Ford" out of the ditch.

Of course, in addition to soil improvement, other projects of minor importance presented themselves and were taken up. I have with me a set of slides illustrating some of these projects. Of course, it must be understood that every farmer visited was a new problem in himself. His soil might be the most common type in the county and his failings might be the common failings of most farmers, but he, as an individual, is different than all others and must be treated accordingly.

The personal side of the work will be brought out as clearly as possible through the use of these slides, and this is indeed a vitally important part of the work, since only as a farmer has confidence in the county agent will he make any attempt to follow out his suggestions. The social side of the work has been emphasized in Will County, because it was a necessary means to an end.

Our farmers did not take to this work "as a duck does to water," but they are beginning to see its value and are therefore very loyal to the cause. The whole theme of county agent work anyway, is *cooperation*, working together in an organized, unselfish way.

ALFALFA.

When the work began in April, 1913, there were less than one hundred acres of alfalfa in the county. Will County farmers had tried it many times and in various parts of the county, but always without success, except in the case of a few patches like the one shown in the picture where there was a large enough amount of lime in the soil to insure a fair stand. Patches like this one were yielding not over three tons of hay to the acre and by proper treatment including the application of more limestone, thorough inoculation and the application of rock phosphate, and in some cases of manure previous to seeding, the yield could have been more than doubled. In many cases the failure, or partial failure was due to a lack of inoculation and it was difficult to make some of the farmers understand that this was necessary. After the glue method of inoculation became generally known, through frequent demonstrations by the county agent, very little seed was sown that had not been inoculated. These two slides show how simple the glue method of inoculation is and how easily a large amount of seed can be inoculated in a short time. On poor land, like the piece shown in this picture, a good application of manure was necessary during the preparation of the seed bed and where this was not applied the results were not satisfactory, even though the land had been limed and the seed inoculated. In this picture the land had been well prepared including the liberal application of limestone

and the inoculation was perfect as shown by the abundance of tubercles on the roots of the alfalfa, but in the strips down the field where the manure had been spread there was more than double the growth of alfalfa. In other cases where limestone was omitted, and this was especially true on the timber soil and the rolling prairie, there was practically no growth of alfalfa after the first year. On the left of the man shown in the picture, a fine stand of alfalfa can be seen and to his right there was practically nothing but grass and weeds. He is standing on the line where his supply of limestone ran out and in the next picture where the land had received limestone, phosphate and inoculation a very satisfactory growth was secured.

The acreage of alfalfa has increased wonderfully during the past three years. I have no means of knowing the exact acreage at present, but believe it to be somewhat over three thousand acres. Most patches are small as yet, from three to five acres, but some fields of forty acres and more have been started successfully. The increase in the acreage of alfalfa is, in itself, worth many thousands of dollars to Will County.



Screening dirt in preparing for the inoculation of alfalfa and sweet clover seed by the "Glue Method," in Will County.

CLOVER.

The acreage of clover, especially of Mammoth and Alsike, has increased greatly. On every farm I visit I have endeavored to impress upon the farmer the necessity of getting at least one-fourth of the cultivated land into clover as rapidly as possible. Many have complained that clover burned out after the oats was taken off and that the risk in sowing clover seed was too great. There are several reasons for clover failure in Will County. One was that oats were seeded too thickly and the clover was practically choked out. Another reason was that the soil was too sour to permit a luxuriant growth of clover and in many cases this acid condition prevented it from getting started. Practically all of our land is low in phosphorous and the application of rock phosphate and of steamed bone meal has been responsible for securing many good stands of clover. In the grain system we get much better results from Mammoth clover than from the common red, but for profit we prefer the Alsike and where the land is properly treated Alsike makes as much growth as the common red clover and in many cases twice as much seed. We are rapidly coming to believe that sweet clover will have an important place on our Will County farms within the next few years. At the

present there are only about fifteen hundred acres of sweet clover in the county, but this has proven so satisfactory that the acreage is increasing rapidly. There is still a great deal of work to do in getting clover introduced in large acreages on every farm. We know that no system of soil improvement can be successful without a comparatively large acreage of clover, and I am trying to impress upon our farmers that the clover crop with us can be fully as profitable as corn and in many cases more so, and that we can well afford to devote from one-fourth to one-third of our land to this important soil builder.

OATS.

We are losing money every year on oats. Our average yield figured at average prices means a loss of from one dollar to two dollars per acre every year. One of the causes of loss in the past has been from smut. In 1913 less than one hundred acres were being treated to prevent smut. In 1914 about sixteen hundred acres were treated and in 1915, following the Farm Bureau demonstrations on how to treat oats for smut in every township in the county, sixty thousand acres were treated at a saving of approximately \$90,000. This year, 1916, enough formaldehyde has been distributed by the Farm Bureau alone to treat 53,000 acres of oats. In practically every county in the State treating oats for smut is bringing larger money returns than any other piece of demonstration work.

Livingston County and Champaign County got an increase of 5.6 and 5.7 bushels by treating. On fourteen demonstration strips in Will County there was an average of 25 per cent smut. In practically all of the twenty counties having county agents treating oats for smut has become general and doubtless within the next two or three years it will become as general as sowing oats. I have endeavored to impress upon our farmers the importance of fanning and grading oats and of lighter seeding. The drill is coming into more general use in Will County and farmers are also taking more pains with their seed bed than formerly. For the past three years we have been endeavoring to find out what variety of oats is best suited to our needs and this year we have conducted a variety test and have secured accurate data on the comparative yields of four strains of Kherson oats as compared with the Silver Mine and some of the later varieties. We find that the Big President oats is a remarkably good yielder, but I am recommending generally the smaller early oats because their yield is good and because they ripen early and thus have a beneficial effect upon the seeding of clover in them. Our variety test is continued on a larger scale this year.

CORN.

From the start, a great deal has been done towards the improvement of the corn crop and in the Fall of 1913 we were holding seed corn meetings in every township in the county, like the one shown in the accompanying picture.

These meetings were very informal and were usually held in a barn or crib where a short talk on seed corn was given, usually illustrated with charts and where the various points on corn were thoroughly discussed. In some cases the meetings were held at the edge of the field and a talk on seed corn was given to the farmers sitting around on the ground as shown in this picture. Following the talk the whole party went into the field where the parent stalk was examined and discussed. After this the farmers went into the field and picked out five of the best ears that they could find according to their own opinion of good seed corn. In some hills we would find a good stalk bearing a good sized ear and in the same hill a sterile stalk which was "just standing around doing nothing" all summer. It was interesting to note the number of older men who attended these meetings and who were intensely interested in learning how to pick seed corn scientifically. After each had found five ears, we gathered again and laid the corn down on the ground and discussed the relative merits of each sample and had one of the older men pick out what he considered the best sample in the lot. Many of our farmers are growing corn too large and too late for this locality. On this farm, a large yellow dent had been grown for many years and practically

always failed to mature properly. Our crop and stock exchange has been the means of distributing a good deal of seed corn all over the county. Our seed corn, seed oats, seed wheat and clover seed are advertised monthly in our sales bulletin sent all over the county and are also advertised in our show window in the Adam Arcade Building in Joliet. We maintain an employment bureau and have furnished farm help to many Will County farmers.

In order to get everyone interested in corn, and to get the people together socially, we started a series of old fashioned husking bees which proved so successful that they have continued every year in larger numbers. The first husking bee held in Will County was in Channahon Township where a crowd of about 150 people gathered. Over 500 people attended the first Manhattan husking bee and at the last one held at Manhattan over fifteen hundred people were present. Teams were chosen and each team husked but one hundred ears. The work was graded according to a score card, the team finishing in the shortest time and doing the cleanest work being declared the winner. Following the husking contest a binder twine tying



Our seed corn meetings have stimulated interest in the selection, care, and testing of seed corn, and this has added to the agricultural wealth of Will County.

contest is held, the winning team stringing up ten ears of corn in the shortest time. In this way everyone learns how to make a cheap and efficient seed corn hanger. The really serious purpose of the husking bee, however, is to get people acquainted with the points to look for in picking seed corn and to get them to agree upon a uniform type of both yellow and white seed corn for Will County. On every occasion a supper is served for which a small charge is sometimes made.

BETTER ORCHARDS.

Years ago Will County used to produce good fruit, but our orchards have been badly neglected and are no longer even profitable. Our "better orchard" demonstrations held in cooperation with the University of Illinois, did much to awaken interest in the care of orchards all over the county. Meetings were held in eighteen of the twenty-three townships. The University sent Mr. Alfred Gunderson of the Horticultural Department to help in this work and we traveled around the county in the little "Ford" delivery

car kindly loaned by one of the merchants in Joliet, Mr. A. E. Dinet. We carried with us a barrel spray pump with hose and rod, various spraying mixtures and pruning saws and knives. Mr. Gunderson demonstrated the best method of pruning fruit trees of all kinds and mixed up and applied the winter spray of lime-sulphur. He preceded the demonstrations with a short talk on the methods of pruning and spraying and answered questions regarding the best varieties of fruit of all kinds in our locality. So much interest was aroused that there was a strong demand for some one to do the work of pruning and spraying for the farmers of the county. We secured three college students who spent their entire season with us and cared for the orchards of a number of Will County farmers. In the fall, these students prepared an exhibit of fruit showing the proper method of grading and packing apples and names of each variety. This exhibit was shown in our show window and it attracted a great deal of attention.



Three students were employed to do custom spraying in Will County. The plan is working admirably.

WHEAT.

Wheat has been found to be a very profitable crop in Will County and one of our best farmers, Mark McClure, of Manhattan, has demonstrated that wheat is, if anything, the most profitable crop for this section. The acreage of winter wheat has greatly increased during the past three years and this is due very largely to the fact that Mr. McClure and others who are following the Illinois system of soil enrichment are securing big yields. In the accompanying picture the wheat averaged 56½ bushels to the acre on forty acres, a record yield for Will County. We are coming to feel that a four-year rotation of wheat, corn, oats and clover is well suited to our conditions and is more profitable a rotation than one including more corn.

Another interesting phase of the work has been the branch office service. Last winter branch offices were established in nine different localities and an office day was held once each month, giving the farmers an opportunity to come in for consultation with the county agent and keeping the county agent in closer touch with the farmers.

During the past three years there has been a greatly increased interest in permanent silos, such as the solid concrete, the clay block, concrete block, and the concrete stave. The number of silos in the county has increased by some 500 per cent during the life time of the Will County Farm Bureau.

Our automobile observation tours have done worlds of good in awakening farmers to the knowledge of what can be done in Will County. One of the longest automobile tours attempted by the county agent was that to the sweet clover fields at Rochelle when seventy-five automobile loads of farmers from Livingston and Will Counties visited the sweet clover fields of W. P. Graham. The tour extended through Kane and La Salle Counties and our people were much interested in the fine farming counties through which they passed and in seeing the large acreages of alfalfa and the large number of permanent silos. Our annual automobile tour of Will County is always of intense interest. We visit the State Experiment Station on the William Webb farm at Lockport every year and we usually visit the prison farm, among other points of interest. In this picture, the automobiles are seen pulling into the forty-acre field of alfalfa on the Honor Farm near Lockport. This is a close-up picture of the county agent's machine carrying the president of a well-known agricultural college, the secretary of the Joliet Association of Commerce, the superintendent of the Honor Farm and the county agent. One of the points of interest visited this year was the oats variety test on the Warwick farm. The tour was taken on June 30 and at this time the oats were showing up in fine shape. The Will County Farm Bureau has conducted two excursions to the University of Illinois and plans to go every year. Half fare rates are secured and ample provisions are made at



Will County "Annual Auto Tour." Over 200 machine loads of farmers spend one day a year in studying better farming in their own county. The scene here is on the Joliet Home Farm. Second cutting of alfalfa on 40 acres.

the University for handling the crowd to the best advantage. Usually two hundred or more people take this trip.

This is a meeting of the Will County Home Improvement Society, in the office of the county agent. This society is affiliated with the Will County Farm Bureau and holds monthly meetings in Joliet. The plan is to form as rapidly as possible neighborhood clubs and hold monthly or bi-monthly meetings in the neighborhoods with just occasional meetings at the county seat. They hope later to employ a woman adviser in home economics as Kankakee County has done.

This is one means of distributing information among the farmers of the county. The Will County Farm Monthly is issued on the 25th of each month and goes into every farm home in the county. Besides timely suggestions on various phases of farming, it contains our monthly sales bulletin. The two bulletins, "Alfalfa in Will County" and "Alfalfa and Sweet Clover in Will County," have been helpful in disseminating information regarding these two valuable crops. We published also, in cooperation with the University of Illinois, a circular on orchard care. My annual report is always printed and widely distributed in the county.

Previous to April, 1913, only a few tons of limestone had been applied to the land in Will County and since that time, or in the past three years, 9,158 tons have been used, largely for alfalfa. Previous to 1913 only a few

cars of phosphate had been used and since that time 4,310 tons have been used at a saving over previous rates of \$6,447.

In the purchasing and distribution of pure seed, especially of the right kind of alfalfa seed, it is impossible, of course, to estimate in dollars and cents the value of an educational work of this kind, but it is safe to say that in every county in the State it has paid several hundred per cent interest on the money and time invested in it.

It is difficult, indeed, to estimate in dollars and cents, the value of any educational work and perhaps it is folly to attempt to do so, but we can say that \$90,000 represents the saving to Will County farmers who treated their seed oats to prevent smut; that \$6,447 is the amount of saving in buying phosphate through the farm bureau, and that a \$25,000 a year business is being done through the crop and stock exchange.

Who can estimate in a financial way the value of the stimulus to Will County agriculture emanating from this movement? Who can give figures representing the saving to those who have, through this agency, purchased good seed, secured competent farm help, and who have learned to lay out profitable systems of soil improvement and crop rotation.

The State of Illinois spends vast sums upon its University. Does anyone ask what the University is bringing into the State in dollars and



Will County farmers now visit the State University and the agricultural experiment fields once a year. (Farmers leaving the train at Champaign.)

cents? Take the broader, saner view of the work of the county agricultural agent.

ADDRESS ACCOMPANIED BY STEREOPTICON SLIDES.

Mr. GRANNIS. The alfalfa crop in Will County in 1913 was something like 150 acres and during the past three years it has increased to about 2,500 acres, though that is not so good a record as has been shown in some counties. Now, the glue method of inoculation has been written up in bulletins, published in our local papers and I had sent out circular letters dealing with it, giving simple, explicit directions dealing with it, but in a good many cases I had to go out to the farm and show the people how it was done by actual demonstration. Wherever it was possible I got a group of people together. In this picture these two men had something like 400 pounds of sweet clover to inoculate, and I had to show them how it was done, all the way through. In this picture the soil has been sifted on the seed and is ready to be worked in with the hand.

The next picture, which should have come first, will show you how the glue solution is worked into the seed, and the seed worked up pretty carefully. This was a case in alfalfa where both limestone and phosphate had

been applied and the seed inoculated carefully, but this was a poor piece of land, land which would grow only about fifteen bushels of corn before this, and was not in shape physically, and did not have any organic matter, nitrogen enough to grow alfalfa. This is the manured strip, through the same field; see the difference? The growth of alfalfa there made practically four times as much as the unmanured piece. In this case everything but lime was applied, and the land was phosphated, but this man's lime ran out just before it got to the strip there where his left hand is. In the next picture you see the limed strip, and the lime shows what made the difference in that case.

For our timber land in Will County we have been pushing clover, because as someone said this afternoon, clover is the key of the whole situation. We are trying to get the Illinois system of permanent fertility working on our farms and we cannot do it without clover. We have been learning how to grow clover. We have been learning that in some cases our land was sour and needed limestone and in some cases low in phosphorus, and that made the difference between a good clover crop and no clover crop. In our section we must get clover that is almost as profitable or as profitable as a corn crop, and when we can get clover such as this that will make that much of a growth by the 1st of August, or that much by the time it is cut off, or make a hay crop or a pasture crop or put in the silo, or that will make three to twelve bushels of seed to the acre, we have something worth looking into. We have about 1,500 acres of sweet clover in Will County and the method of handling manure was one of our problems. This man solved it by building a barn on the land there, and running it out to the house by means of a carrier and dumping it into it.

This is in Homer Township, Will County. As I said before, Will County has lost enough in every year—or has in the past—to pay the running expenses of our farming bureau for fifty years. In 1913 there were about 150 or 200 acres of oats treated for smut. In 1914 there were 1,600 acres, in 1915, or the past year, there were 60,000 acres. This is one of our smut crowds, practically all farmers, at a little cross-roads store. I gave them a demonstration of how to treat oats for smut. I mixed up the formaldehyde and mixed up the oats and I had them cover it, and I went through the whole process with them, and it resulted in practically every farmer who attended this demonstration and many others which were held, in treating his oats this way. We are losing money on oats. We figured it out we lost about \$1.25 to \$2 a year an acre on oats, yet we kept on growing them. We think one reason is the fact that we seed too heavily. I use this picture to illustrate what may be done with light seeding. The seeding in this case was one bushel of oats, and the yield was ninety bushels to the acre, Silvermine oats. The oats were used in this case as a nurse crop for alfalfa. Of course, the fact that the land was well prepared by the use of lime and phosphate had much to do with this yield of oats, but it is not necessary to sow three and a quarter or four bushels to the acre. We began our improvement on corn by a series of corn meetings; we held them in 1913 and 1914. This year there was no corn to hold any over. These meetings were held in little groups such as you see in the picture. I gathered them together some place where I could hang my charts and gave them the method of working corn, and then we went into the field and I had two men go down to raise corn, go right down the field and select the best he can find. We are growing every kind of corn in Will County from the white cap corn to the large yellow dent, corn that is too large and too small, corn that does not yield all right or what it should, and we are trying to get together on a county type of corn.

This meeting held over in the German section of the county, the eastern part of the county; notice the farmers gathered around on the corner of the farm there listening to the talk. This is the same group out at the edge of the field, under a tree, the old men as well as the younger men are greatly interested in the work. There is an old German probably seventy years old; he was just as pleased as anyone in picking out his five ears of corn, and he brought in five mighty good ears, too.

The parent stalk, or the relation of the parent stalk to the yield has been brought out pretty strongly in our seed corn meetings. I got these two stalks out of the same row, one was a barren stalk and the other was a stalk bearing a pretty fair ear. And also, the additional fact that the corn should not be selected because it has good characteristics in the ear, but because of the stalk it came from, the height of the ear on the stalk and the inclination of the stalk and the number of stalks to the row, as they all have a great effect on the yield of the corn.

In this case these men are just starting out into the field picking out their five ears of corn. I am trying to point out something here about their characteristics, the stalk I have just been talking about.

We are growing the crop of corn that comes from possibly this far south in the State, and we seem to keep on growing it, yet every year we are getting "stung." We got stung pretty badly this year. In this case this is a pretty big yield, two tons, and that would be all right down here, perfectly satisfactory to this part of the State, but we have to grow a smaller corn, earlier maturing corn, because we are nearer Lake Michigan and our conditions are different.

This is the group you saw in the first corn picture. It happened in this case a banker from a neighboring town, not a farmer at all, picked out the best five ears of seed corn. We had one older man who did not participate in the contest acting as judge. There was a group of corn lying on the ground, and it just happened that the banker who was the man standing at the left there, had the best five.

During the fall and winter months we have our samples of seed corn displayed in a show window on the street there in Joliet. Last year through our stock market exchange we sold about \$25,000 worth of farm products. We are working on the marketing end pretty hard. We found a market for practically all of the seed corn we had among our people. We found good seed corn for a great many farmers who never had an opportunity to get home grown seed corn before. The same is true of oats; the same is true of clover seed. We go a little further in this work than some of the other towns; Joliet is a fairly large sized town and they are interested in this work to this extent, interested in the producer to consumer exchange, so we are selling country sausage and maple sirup and apple butter and honey and dairy butter and a good many other things through this medium of exchange; there were eggs and other things there, too. The people came right into our office and got those things, the farmers shipped them in by parcel post or express and the city people come into the office and pay cash for them. I might mention in this connection also that we maintain an employment bureau, and during the season of 1915 we placed twenty-five mighty good farm hands. The farm labor question has been a very serious one with us. We have been able, through cooperation with the University of Illinois, and some other institutions, to secure some mighty good men, young men who are interested in the work and wanted to learn something and are willing to work hard; and during the fall and winter months we always have help.

An old-fashioned husking bee. The first successful one we held was in Channahon Township. This is a section of the crowd seated out in the pavilion. There were 150 people there that night. We had a regular old-fashioned husking bee, but instead of hunting for the red ear, the young man was asked to hunt the best looking ear of corn from a score card standpoint. In this case, at least, the young man finding the best looking ear was privileged to kiss the best looking girl in the room. She happened to be sitting in the center of the stage there.

These husking bees grew in popularity until about the third one we had we had hardly room for husking or for the program we intended to carry on. You will notice there were several piles of 100 ears, of large snap corn. Those are husked out by teams, usually a young lady and a young man. In this group there are men, women and children, young as well as old. After the husking was over we had a tying contest. Strange to say, very few people knew about the seed corn anchor. The use of the ordinary binder

twine for an anchor for stringing up seed corn a good many learned for the first time in this tying contest. After the tying contest, the floor was cleared and we had some good, old-fashioned square dances, participated in mostly by the old people. The younger people stood around and watched them. They had never seen anything like that. We have had these husking bees for three years now. The really successful part of the program came in when someone gave a short talk on seed corn, and the methods of collecting and storing and testing seed corn were explained. This was the real purpose of the husking bee. Another important feature was the supper that was served. There was a supper served that evening for about 500 people. They got cider, coffee, a doughnut, an apple and a sandwich, for which no charge was made.

Now, the orchard proposition seemed a pretty serious one to us. Joliet is a good market for fruit, and previously Will County had been noted for its good fruits, and the people in town began to wonder why we could not show up some good fruit, and so, with the cooperation of the University of Illinois, and Mr. Gunderson of the Horticultural Department, we toured the county in the Spring of 1914, and Mr. Gunderson gave a pruning and spraying demonstration in practically every township in the county.

The little "Ford" delivery car shown in the picture was loaned by one of the merchants of Joliet for the purpose. He supplied the car and the gasoline and everything but the driver. This is the spraying demonstration, Mr. Gunderson putting on one spray of lime-sulphur. Now, these meetings had a far reaching effect in the county and the people began to take a pride in their orchards, but as you people know who live on a farm, a farmer does not have time to really care for his orchard as it should be, and we try to solve that problem by getting these three students who were well equipped for the work, to go around in the different parts of the county doing spraying. Last year they visited thirty-one farms and sprayed thirty-one orchards, two sprays. They were all equipped for the work with a spray, pump, and two leads of hose. They carried their equipment around in a Ford delivery wagon and rode to thirty-one farms within the fall. That was last fall, 1915. These students put on a fruit display in our show windows showing twenty varieties of apples, properly packed and named, and there was always a lot of faces, especially those of children pasted up against that window. The apples were well sorted; they were number one apples and they looked good to the people and then the people began to come into the office and wonder where they could buy apples like that. We had apples going to waste, rotting on the ground last year and the farmers were glad to bring them in for twenty-five cents a bushel. After that display, farmers were glad to bring some in and we sold them for them at eighty cents a bushel. People were just crazy about them.

This is the wheat field of Merritt McClure of Manhattan; the yield this year was fifty-six and one-half bushels to the acre. Mr. McClure is a grain farmer. He has a five-year rotation; wheat, alfalfa, corn, oats and clover. The yields of wheat that Mr. McClure has been getting have done a great deal to get our farmers back into the habit of growing wheat. Wheat froze out with most of us as it did with you in the year 1912, and our farmers have been afraid of it, but the big yields that Mr. McClure has been getting and the big profits he has been getting have induced a lot of people to go into it and inquire how he got his big yield.

The next picture shows Mr. McClure cutting smooth wheat with his twelve-foot push binder. This smooth wheat yielded fifty-eight bushels to the acre. This is a twelve-foot binder, six horses hitched on behind, a push binder.

The permanent silo has come into more general use since our bureau started. There seemed to be a general prejudice against the concrete silo, but now a number of concrete silos and clay silos and concrete block silos are being put in, everything but the wood silo, although we have plenty of wood silos. But, where people are feeding cattle and in the cattle business generally, they are putting in the more permanent silo. A silo like you see

in the picture costing \$510 complete with the roof, and chute, proving very satisfactory. This is its second year.

Our automobile trips have been very interesting, automobile inspection trips. Possibly it is not wise to take very much time away from the farm during growing season, but there are little times when we can get away and see something of interest to us. This is a long automobile trip taken by county agents—one when the county agents of Livingston and Will County went up to Rochelle to see four hundred acres of sweet clover grown up there by W. P. Graham. That is a crowd standing in the spring seeding of sweet clover.

Another view of the same crowd listening to Mr. Graham talking sweet clover.

Every year we have what we call our annual automobile tour. We have all the way from 50 to 75 and sometimes 200 machine loads of people. We travel all over the county and go first to the State Experimental Station,



Since Mr. McClure has been getting such bumper wheat crops, (1915, 56.5 bushels per acre), more Will County farmers are growing wheat. The "Illinois System" certainly pays.

and then on to the William Wood farm, and usually go over to the prison farm to see what they are doing over there.

This is in forty acres of alfalfa. This is a second cutting. Then we visited the farm of Mr. McClure, and other interesting farms in the county. These automobile tours do a great deal of good for us.

We picked out a variety of oats this year, four small varieties and two large varieties, to see if we could not determine what would be a suitable variety of oats for our county. The best I could do on a poor piece of land was seventy bushels.

This is a machine carrying the secretary of the Association of Commerce and a few others. A kind of a close-up view. Every year we plan to go down to Champaign and visit our State University. We have been successful twice at least in securing a half fare rate. The first time we went down there—the picture shows the crowd getting off at Champaign—there were

236 people made that trip. This year the trip came a little earlier, at a rather inconvenient time and 160 people made the trip. We go down there and the University people take mighty good care of us. We are taken out to a stock judging exhibition, and then they have a lunch provided, and some of the people down there talk to us on various subjects, after which the crowd is divided up into smaller groups, about fifty in each group and each group is furnished with a guide, and we visit the University buildings.

Here are four of our publications. We are publishing now a monthly paper, which is—just as Dekalb County is doing, and Peoria County and some other counties—known as the Will County Monthly. We are trying to make this paper as timely as possible. For instance, in the February number, we made up an oat number; everything relating to oats, every idea and suggestion, for instance, about treating oats and at this time of the year about treating for smut, and where to get formaldehyde and how to use it. These papers also contain the monthly sale bulletin, which lists everything we have for sale; lists the farm help we have available and wanted. The first publication we got out was, "Alfalfa in Will County," which was just simply the process for growing alfalfa in the county, and then we followed that up with "Alfalfa and Sweet Clover in Will County."

Now, since I have had that slide made, the figures have changed. The tons of ground limestone used in Will County up to date is about 11,000 tons. Tons of rock phosphate used up to date something like 5,000. Savings to farmers' land on these rates—we had been paying all the way from seven and a half to nine, and figuring seven and a half—was \$6,447, which would pay the running expenses of the Farm Bureau for at least a year.

The women's auxiliary recently formed of our Will County Farm Bureau, meets monthly in Joliet, and it is meeting and having a program in the county agent's office. There are 91 members in the women's auxiliary and they call themselves, "The Will County Home Improvement Association." As rapidly as possible they are forming township clubs which meet monthly also. The county agent's office is very kindly furnished by the Joliet Association of Commerce. We have a very nice office there and we are able to hold meetings in the office, and also have an assembly room across from the office.

For the past two years we have had what we call a branch office service. We have nine branch offices; sometimes these offices are held in banks or elevators in different parts of the county. I get out at least once a month and visit these branch offices and spend a half a day to a day there consulting with the farmers. This happens to be the branch office over in Monee, some thirty-five miles from the county seat, where the farmers practically never get to the county seat, going to Chicago or Kankakee instead. The branch office idea we find has been of great benefit.

Now, you will wonder what that has got to do with agriculture, but the personal side of the work, after all, is the big thing. The whole thing and the whole feature and the big idea in county agent work is cooperation; that is the topic of it, and anyway that is the whole idea in county agent work, and the county agent has got to get the good will of every farmer in the county, just as that young man is getting the good will of that young lady in the picture, in order to be successful with his work.

I thank you, ladies and gentlemen, for your kind attention. [Applause.]

PRESIDENT TULLOCK. I am sure the next speaker who is going to address us does not need any introduction to this audience. I am pleased to present Dr. A. R. Taylor, president of the James Millikin University, who will talk on Education for Efficiency.

Mr. TAYLOR. I find myself very much embarrassed in the presentation of this stereopticon demonstration, which has just been given to us because of the fact that it seems what I have to say should come before that demonstration.

Could anything be more convincing, could anything have greater influence, even upon men and women who are not so well informed as you are, than this presentation which has been made to-night? I am going to talk to

you, in accordance with the topic submitted to me, on Education for Efficiency.

The objects of education among all nations have always been as varied as the character and occupations of the people. Hence, their philosophers and educators have stated them in many different ways, sometimes with a religious bias, sometimes with a philosophical, sometimes with an ethical, sometimes with a military, sometimes with an industrial or practical, sometimes with a professional, sometimes with a patriotic bias, sometimes placing it in the life that now is and sometimes extending it into the life to come. Among them all, however, another idea is ever present and that is the element of efficiency.

So there is nothing particularly new about it to-day, though no other word is so frequently used in connection with the word education as the word efficiency.

I take it that this is due to the fact that we are forgetting the other multiform objects of education in our absorbing desire to increase our wage earning power and the profits in our business. The harm in it, if there be any, lies in making that the chief end of our education, to the exclusion of those which involve our highest well being and to the attainment of which they should always be contributing.

Among the placards on the walls of our schoolhouse when I was a boy was this very suggestive one, "Knowledge is power." And that was the thing which I wanted and for which I longed. I had no well-defined idea what I would do with it but I wanted it. I did not even go so far as the old lady in the story book, who sat at the window every day looking at the trains as they passed by her home. One day her daughter asked her what in the world she was doing it for. She replied, "Oh, I am not watching the trains so much as the dog which runs after it and barks so fiercely at it every day. I just want to see what he will do with it when he catches it." That maxim, however, shows that the doctrine of efficiency was its inspiration, for what is power worth without ability to use it?

There is no learning that has ever been developed that is not shot through and through with the idea of efficiency, of multiplying man's power and increasing his skill in doing things worth while.

Take the subject of mathematics for instance. Now, most people seem to take it for granted that it was handed down to man from some high mountain like the ten commandments, all fashioned and finished from notation to integral calculus and beyond. They seem not to know that it is a growth, nourished and stimulated and organized by man's necessities for the purpose of multiplying his power in solving the great problems of the universe and in bringing it under his dominion and control.

As all of you know primeval man could only count and not very far at that. It was perhaps hundreds of years before he invented the process of addition, a short method of counting.

THE UTILITY OF LANGUAGE.

Is it necessary for me to stop and tell you how dependent upon the science of mathematics is every other science and every other art that makes man's progress possible? If men were to forget how to use it to-night, not a wheel would turn in any industry, not a commercial house would open its doors, not a ship would sail from any port on the earth to-morrow.

Some philosophers insist that language was handed down from God ready made also, and this in spite of the fact that in a single generation the number of words in the English language alone has more than doubled and that those in common use have increased five or six times as much, in that period.

Why, when I was in college we were assured that the average man used but two or three thousand words, while to-day a child of seven or eight in many a home is using that number. I made a test a few years ago that satisfied me that a lady friend of mine could understand and use intelligently fifty or sixty thousand English words. Think how this great multiplicity of words with their varied combinations will express an infinite variety of

ideas, thus increasing man's power in everwidening degree to think out and organize and express his discoveries, his experiences, his inventions, his aspirations, his hopes and his fears, and you begin to see the utility of language and its efficiency in contributing to the advancement and happiness of the race.

If all men were to lose the gift of tongues to-night, they would go about like mumbling, blubbering idiots to-morrow.

There are, of course, what we call pure sciences into which men plunge and passionately devote their whole lives from pure love and enjoyment of them, but all of them have an intensely practical side, also have their application to the problems of every day life, the problems of the individual and the community. The disappearance of almost any one of them would have almost as disastrous an effect on our industrial and commercial interests as the loss of mathematics or language, so interdependent, so far-reaching, so vitally necessary are these great knowledges to the existence of our civilization.

TRAIN TO THINK ACCURATELY.

It would appear then that a general knowledge of the elements of the various branches of human learning with specialization in those which more directly relate to the occupations we expect to follow would insure efficiency in its pursuit. The day has passed when general scholarship is supposed to be necessary only in what we call the learned professions. It is now regarded as necessary in every occupation in which man is anything more than a machine and even there it is far better than he be a thinking, reasoning, machine. An education for efficiency must include the development of the thinking activities to the highest possible degree. A legal friend of mine says that if he has but twenty minutes to do a thing in, he often takes fifteen of them thinking it out. Another placard in our old schoolhouse read "Think before you leap." Now while I have known men to take so much time in thinking that they lost their opportunity, that usually was because they had not been trained to think accurately and rapidly and comprehensively in early life. An education which omits it is unworthy the name.

Kreutzer, the great living violinist, says that he owes his success chiefly to his habits of thinking out everything he plays. This he does over and over again, oftener without his violin than with it, hence his marvelous skill in execution and expression. A fine illustration of the natural way in which man has come to use mathematics, language, writing, drawing, etc., to increase his efficiency in the mechanic arts is given by Prof. Millikin of one of the Chicago manual training schools.

He states one morning that a chunky boy, thirteen or fourteen years of age came into his office and said, "Mr. Millikin, I would like to enter the class in carpentry." Mr. Millikin said, "I suppose you desire also to enter the class in reading, arithmetic and drawing. Have you ever been to school before?" "Not much, sir, but I don't want to take anything else but carpentry." Mr. Millikin thought a moment and then finally concluded to indulge the boy, and suspend the rules in his case, and in the course of a fortnight the boy appeared before Mr. Millikin and said, "I wish to go into the class in reading." "What do you wish to go into the class in reading for?" "Because of the fact that I find I am unable to read the directions given to everyone of the boys, the other boys read them very readily and I am compelled to wait until the teacher comes around and explains mine to me. About a fortnight later he came back and said, "I wish to enter the class in writing, for the purpose of being able to help myself, and being able to do my work much more satisfactorily and more readily." About a fortnight later he came in and said, "I wish to enter the class in arithmetic." Prof. Millikin said, "Why do you wish to enter the class in arithmetic?" "Because it is necessary to do some calculating and I am not able to do it. The other boys are getting away ahead of me. The teacher, I know, is getting impatient with me," and so, he was put into the class in arithmetic. Later on in the class of writing and drawing.

In our efforts to formulate courses of study to increase the efficiency of our youth, it would appear then that we have not gone far astray and that so far as the subject matter is concerned we are making satisfactory progress.

Educational reformers have been very prone to make fun of the old curriculum in our schools which embraced little but the three "R's, readin, ritin and rithmetic." But with every successful step at its enrichment they have been compelled to build their courses around them and concede them the highest rank in the list through the grades and the high school and on into college.

A FAD FIFTY YEARS AGO—NOW UNIVERSAL.

If all this is true then what yet remains to include in our educational scheme for efficiency? One very important thing is the relative amount of each branch to be included in it. Another is the order and sequence of each subject, another is proper facilities in the way of buildings, equipment and apparatus, but even more essential is a proper conception and observance of the educational processes that produce the desired efficiency. All of the foregoing may be present, but if it be lacking defeat must result. Fortunately the labor of hundreds of years has made the method and order of sequence in each particular subject so clear that the better textbooks are invaluable aids to the teacher and pupil. The process of determining the value of one method of instruction above another is not so easy as some people imagine. Take the method of teaching reading as an instance; many of you were taught by the alphabetic method, but since your school days the word method has quite generally supplanted it, two or three revolutions have taken place in methods of teaching arithmetic and penmanship and language and the natural sciences, perhaps all of them with much gain to each branch. The laboratory method of teaching certain subjects was a fad fifty years ago; it is now almost universal, though undoubtedly unwisely used in many elementary and secondary subjects.

Of course, method as a formal thing is of little value without the personality and leadership of a skilled instructor but he multiplies his power by following the best one.

A concrete example of the nature and value of scientific method is found in the improved method of teaching typewriting. If any of you have had any experience in learning how to write on the typewriter, possibly then you began somewhat as I began, and that is by simply using one finger, and probably by and by learning to use the second and third and so forth. Nevertheless, the process was a very laborious one and you never attained to any great speed or accuracy.

Now, our teachers of typewriting, following the suggestions, the scientific suggestions that have been made for so many different branches in these modern days, undertook to study the formation of words and the anatomic construction of the hands and arms, and they found that there was a certain relation between those different muscles and certain prefixes and certain suffixes and certain particles, and words that are used over and over again. Now, they proceed, I think it is the Ragen system of finger exercises, which in and of itself is well adapted to the discovery which they have made, to develop the muscles for words in common use, and as a result of that, typewriting has taken a wonderful stride and advance, and those who have been taught by that method are able to take down notes almost as rapidly as I am talking to you at this time. Many of you understand as you walk into the telegraph office that some of the telegraph operators sit there and write directly from the sound of the key itself. Not only do these people who have been taught typewriting in this modern scientific way attain such speed, but they attain with it almost an inconceivable accuracy.

EFFICIENCY IN THE ART OF TYPEWRITING.

I have had at my desk during my experience a large number of typewriters and stenographers and I have been very much surprised by the comparative few of them who are able to take my words and who are able

to write them on the typewriter with what we call half speed. There is, occasionally, one, however, who is able to take dictation and write as rapidly as I named a minute ago. Some years ago I sat down at the table of a typewriter in the city of Los Angeles, and after asking a few questions with reference to her training and her speed I began to talk to her and I talked to her as rapidly as I am talking to you at this particular time and she had no difficulty in keeping up to me. I had very great curiosity as to the kind of manuscript she was going to present to me, and after she had finished I took it in my hand and it was a thing of beauty from first to last, the alignment and spelling were perfect, the capitalizing and paragraphing were better than I could do myself. I did not discover a single mistake in capitalizing or punctuation. I satisfied myself she had not lost a single word I had uttered.

Are you aware of the fact that as far as that woman is concerned she could not take all of those things into conscious consideration, but by the training she had taken she had so thoroughly interwoven and made them into her physical and mental fibre, that as I was passing along this way she was unconsciously performing all of those things, but it was a marvelous triumph for efficiency in the teaching of typewriting.

What is true of typewriting is also true of the piano. Some of you are not old enough to recall the day when the piano was not taught with any great degree of method, but in this late day finger exercises are taught in such a way that by long practice these boys and girls are given the most marvelous speed in the interpretation of the most difficult pieces and the most difficult selections of music. You also are aware of the fact in their playing that most of them are not thinking about the composition, the selection however difficult they are playing, but they simply move along through the composition with the greatest of ease, almost as a matter of habit.

These illustrations show the vast gain that comes through the proper construction of a typewriting and a piano playing physical organism on the one hand and its counterpart in a correlated mental organism that responds automatically and with incredible speed to the demands made upon it.

Now, the kind of an education that gives the highest efficiency in every line of human activity is that which constructs the organism, whether physical or mental, or both, that will successfully react upon the ever-recurring problems of everyday life. If the learning process is wisely directed in the schools, the accompanying development of such organism with such skill is assured.

TOO MUCH TIME SPENT IN MEMORIZING.

We are still too frequently imagining that memory is the important thing in education and that he is well educated whose mind is loaded with a vast fund of information upon which he can draw as occasion demands, hence far too much time is spent in memorizing which is usually a most painful and interest-killing process.

I think Solomon must have had this in mind when he said that much study is a weariness of the flesh.

We are fast learning that there is a better way, which if intelligently followed, minimizes the necessity for memorizing and yet weaves the knowledge of each day's experiences into the fibre of our being in such a way that it spontaneously appears as needed, reinforcing perception and judgment, thinking and reasoning, invention and skill.

The process of organizing and systematizing knowledge also organizes the self and this reaction is the miracle of the act of learning.

Recurring again to the story of the increasing power developing in the advancing mathematical processes and to that of the typewriter and the pianist, we ought now to see the transcendent value of scientific method and the way it contributes to efficiency of the higher sort in the making of men and women of the larger vision and readier skill in devising and accomplishing things.

The important thing for us to remember in all of this is that such an education leads to mastership, initiation and creative power because the

youth is relieved of the necessity of spending his thought and energy on the mechanical part of the process and can give them untrammelled to the comprehension and solution of his problems.

The earlier steps in learning to walk and to talk require all of the attention of the child, but soon the impulse to walk is the same as the pushing of a button to any automatic machine and off he goes, the walking mechanism already formed taking care of itself, without any conscious direction from him thus leaving his mind free to think of a thousand different things as he walks along. How laboriously he works the muscles of his mouth to articulate his first words and how soon his talking machine goes off at the first suggestion and runs all the day long without effort and without weariness on his part. Who of us are conscious of giving any attention to the movements of our vocal organs in speaking or singing or even to the words we use in ordinary conversation? We even lose ourselves so completely in thinking that the appropriate words expressing our thought crowd along and out of their own accord.

Efficient workmanship everywhere, whether of hand or brain, is equally free from all conscious attention to the mechanics of the process and hence is the goal of all rational systems of education.

The manual training schools have accomplished their mission when they have taught their pupils how to use tools skillfully; that is their chief concern; after that they are ready to enter the trade school where their entire thought is given to the completion of the finished product instead of to the use of the tools; that now takes care of itself automatically and unconsciously.

In just such a manner does all the training of the schools and of life lend itself to a man in the pursuit of his chosen occupation, reinforcing and enhancing his efficiency with each returning day.

It goes, of course, without saying that at every step accuracy and speed and enlarging comprehension of the elements involved in every new problem are absolutely essential to increasing efficiency. Without these old-fashioned virtues it is simply impossible.

May it not also go without saying that an education for efficiency must include at the opportune time those arts and sciences which more directly contribute to one's preparation for his future calling and which he will ever be utilizing in it?

Out of this doctrine have come all those special schools and those special courses which fit for such a variety of occupations and professions and which have multiplied their productive power in such marked degree.

HOW WE MAY DETERMINE EFFICIENCY.

It may be well now to inquire how we may determine efficiency. One way is by the quality of the work the man does with hand or brain. The significance of this test needs only to be mentioned in such a presence as this. It holds good among workers in wood and stone as well as among workers in gold and silver, among painters of houses as well as among painters of pictures, among growers of wheat and corn as well as among growers of fruits and of flowers, among all the arts of whatever character in which men engage from the shaping of a knitting needle to the construction of a continental railway, from the laying of a brick to the boring of the Hoosac tunnel. It is the test of the mistress of a humble home as well as of the mistress of the White House, of him that rule his own spirit as well as of him that ruleth a city.

Another important test of efficiency is the quantity of work which a man can complete. This is a relative term, of course, for in some cases the finer the quality the smaller the possible quantity. As all of you know, however, there is hardly a single occupation in which men do not vary greatly in both the quality and quantity of the products of their genius and skill. Labor-saving machinery has changed the output greatly in both respects, but the personal element even there has not and never can be entirely eliminated.

Mr. Adolph Mueller tells me that experimentation with a body of men using certain machines in the Mueller factory reduced the number of men required for that kind of work to about one-third of the original number employed, the quality also being much improved.

Superintendent Taylor of the Bloomfield, Pa., smelters, says that in a ten years' effort at educating their employees by the employment of skillful instructors they had doubled their output and greatly increased its quality without employing a single additional man, thus enabling them to make a handsome increase in the weekly wage-check.

In discussing this problem, we must not overlook the fact that some people are naturally slow, others naturally energetic and rapid in all they do; some are sluggish in the apprehension of a problem, others grasp it and its solution as quickly as it appears; some lack ability to plan and initiate, but are skillful in execution; some, in spite of the best the schools can do for them, will always be hewers of wood and drawers of water, while others even with little formal education will be organizers and employers and promoters and masters in their chosen spheres.

Education for efficiency whether given in the schools, in the homes, in the shops, in the counting houses, or in the fields, ought to discover those characteristics and aptitudes and wisely and sympathetically cherish and develop the desirable ones, eliminate the undesirable and cultivate those tastes and talents that give promise of the highest efficiency in one's life work.

It is high time we should quit encouraging young men and women to turn away from occupations for which by inheritance and early experience they are evidently well fitted, to others in which they have little assurance of success. There are many men eking out a precarious livelihood in publishing a weekly newspaper or in running a little store who might have been successful farmers had they not yielded to the lure of the city; there are others who are living off the county to-day who might have been princes among manufacturers, had they not been led by false pride to forsake the shop of their fathers and dabble in a business for which they had no aptitude whatever. It is said that only three per cent of the men going into the mercantile business make a success of it. The explanation is so easy, that I do not attempt to assist you in finding it. We shall soon see whether our commercial schools have found it and the remedy also.

All of these things emphasize the fact that education is a big business and that those who engage in it ought to be well trained for their job. It is inexcusable extravagance to employ any other kind of teachers, even for the lower grades, however small a salary they are willing to accept.

I have already shown you that education for efficiency defeats its own ends when too narrow in its range, when certain correlated or contributory branches are discarded.

FARMING, ONE OF THE "LEARNED PROFESSIONS."

It has been established many times over that the well informed, the thinking, reasoning employee, even in the less skilled manual occupations is always more interested and more efficient than the other class. If this be true, how much more true then is it in the case of those who are working for themselves and managing their own business whether it be small, or large enough to require the employment of many people? A man is always worth as much to himself as to other people and usually more. Quick returns and large profits usually come to the man of large vision and keen foresight whether in the management of a farm or a factory, of a cattle ranch or a packing house.

This Institute is your confirmation of this fact as far as farming is concerned. In my youth I heard a very learned man say that anybody can run a farm. There was some little foundation for the statement in those days in Central Illinois when the virgin soil was so rich that about all a man had to do was to tickle it a little and harrow in the grain to insure a good crop. Were he living to-day he would easily see that agriculture in all its phases has become a very complex business, calling into its management a body

of men and women unequalled in intelligence as a class by those of any other occupation in our country and that no other is engaging such a vast army of scientific men in investigating and experimenting on methods of increasing the productiveness of the soil and securing the highest possible returns to its owner. The sight of a modern farm with its up-to-date equipment and the intelligence required for its successful and profitable conduct would amaze him beyond expression. He would easily see that this knowledge and skill of a farmer must include a great variety of things aside from ability to plow and sow and reap; that he must be a good business man, also in order that he may market his crops profitably and invest the proceeds to the greatest advantage; that he must have wit enough to participate helpfully in the management of the affairs of the community and of the State that the general welfare may be promoted and his personal interests protected.

DO NOT BE A "CAJEAN."

Instead of my friend finding educated men almost exclusively in the so-called learned professions, he would find a majority of them, including college and university graduates, dignifying, exalting, enriching and contributing to the efficiency of every other gainful occupation which men follow, especially that of the tiller of the soil. He would indeed learn that scores of occupations are rapidly becoming learned professions, in the best sense of the word.

I am aware that agriculture in many sections of our country to-day is keeping the farmers poor, because of their ignorance and prejudice against the advances that are being made elsewhere by their more progressive fellow craftsmen.

Many of them lack even sufficient education to enable them to understand and appreciate the great improvements of recent years in the cultivation of the soil, in the way of drainage, irrigation, fertilization, dry farming, rotation of crops, recuperation of soils, introduction of new varieties of grains and forage crops, and of improved machinery, stocking the farm, wise marketing, etc.

In a recent visit to Louisiana, I found the Cajean farmers very generally blocking modern drainage systems and doggedly following the methods pursued by their forefathers in other things for the reason, that "if good enough for them they are good enough for us." Thus they are preventing the rapid development of hundreds of thousands of acres of the richest farming land in America.

On the contrary in the Bellingham district in the State of Washington there are thousands of educated, intensive farmers clearing and draining large districts and in almost a single year increasing their value from \$25 an acre to \$200 and \$300.

In the case of the Cajean, however, some of them are in the advance line and the children of others are in the public schools and agricultural colleges—so great changes are coming in the next decade.

But why take your time to tell you things that you know better than I?

MUST INCLUDE THE ETHICAL.

But it would be a pitiful conclusion of our study of this question, if we were to overlook the fact that education for efficiency would be a dismal failure, if it ignored those elements which build up personal character. An economic education, however efficient without the ethical would be suicidal.

Long ago a friend of mine, a president of a great agricultural college said: Our chief concern is not so much to make industrial workers, but in making them to make men also.

If the end of all living is to make money, to amass a fortune, build barns and princely homes, to become captains of industry at the expense of the higher instincts of our nature, it were better not to have lived at all.

Pat, the ditch digger, was asked why he spent his life digging ditches. He replied, "To earn, some money to buy me some clothes and me meals and a bed to sleep in that I may be strong to work on the morrow." "And what

will you do with the money that you earn to-morrow?" he was asked. He again replied, "Pay for me room and me meals that I may be strong to work the next day." And that was ever the daily round of his ambition.

I would that Pat were the only one among our teeming millions with no higher or broader aim in life than that. An endless procession of skilled, even highly educated, workmen live from hand to mouth in the same way, apparently immune to the appeals of the higher and more wholesome comforts and pleasures which his wiser fellowmen enjoy, those which lift life out of the commonplace and transform the drudge into the man, the artisan into the artist, the serf into the citizen.

No thoughtful person considers a woman fitted to become the presiding genius of a modern home whose only qualifications are that she is a good cook, a neat housekeeper, an expert seamstress and an experienced nurse, however desirable and necessary they may be. She must also possess a sufficiently liberal education and acquaintance with the amenities of social life, crowned with those graces of mind and heart that make the atmosphere and spirit of the home a quickening and refining force in the lives of her children and all others that come under its influence. Is not the happiness and prosperity of her family and the destiny of her children here and hereafter almost entirely in her hands? Where is greater wisdom and greater skill demanded than in their nurture, their training and education?

Even in Solomon's time, three thousand years ago, that paragon of a farmer's wife whom he describes, bought and sold land, planted vineyards and loaded her tables with ripened fruits. The music of the spindle and the click of the loom awoke her maidens at the dawn of the morning. She wove rich tapestries for her couches, and wrought with her daughters fine linen and purple and silk for their clothing. She opened her mouth with wisdom and in her tongue was the law of kindness; she ministered to the sick and spread out her hands to the poor and the needy. She looked well to the ways of her household; her sons and her daughters rose up and called her blessed and her husband praised her as he sat among the elders of the land, in the gates of the city.

An efficient education in its larger sense then must include all of those elements which conspire to make manly men and womanly women, which enable them to enjoy literature and art and social converse to appreciate and enjoy the beauties of nature and the creations of human genius, to take their places and play their part in the drama of our common life and in the conservation and development of all that is best and truest in the individual and the community, whether in the crowded cities or in the open plains, whether struggling for expression among the lowly or endangered by the neglect and the indifference of the devotees of pleasure or of the all-absorbing demands of big business and other engrossing affairs of this busy world.

I thank you. [Applause.]

PRESIDENT TULLOCK. I am sure that you will agree with me that the Farmers' Institute and the city of Decatur are honored by having with us our next speaker, Mrs. Christine Frederick, who will speak on "What the New Housekeeping Means to the Farm Home."

WHAT THE NEW HOUSEKEEPING MEANS TO THE FARM HOME.

(Mrs. Christine Frederick, Green Lawn, L. I.)

Mrs. FREDERICK. I am sure if you will be patient with me I can hold your attention for the time that is allowed me, without letting you go to sleep.

I want to tell you first that I have a right to talk to you as a country woman, because I come from the famed pickle district of Long Island where we are more proud of pickles, I am sure, than you are of your bushels of corn that I saw this afternoon. Also I live in a house which depends for its water supply on two cisterns. We have neither electric light, telephone or gas. Also I am very glad to be here to-night because I am, in part, an Illinois woman, although she was the last person to recognize me, that is,

I have come here last, when I have spoken all over the country, Indiana, Iowa, Massachusetts and other places. I have just come from Iowa. I lived ten years in Chicago, and I feel that I have a right to be one of you here in Illinois to-night. Now, just a year ago I spoke at a convention like this in Pennsylvania State College. When my subject, "The New Housekeeping" was announced prior to my lecture, someone inquired, "What is this new housekeeping, and what can it do for the farm woman?" And I answered the question in my talk by showing that the new housekeeping means to the farm woman exactly what the new farming means to the farm man.



Mrs. Christine Frederick, National Secretary and Consulting Household Science Editor, Ladies Home Journal, Green Lawn, Long Island.

I inquired this afternoon at the registration bureau and they were not able to tell me how many were present, but something like two thousand visitors and delegates are present here in Decatur. And as I look at you seated before me I am struck with this thought: that fifty years ago such a gathering of farm men and women was unthought of. Your grandfather and mine (who happened to till a rocky Vermont homestead) would not have believed that two thousand farmers would be willing to leave the farm merely to talk farming.

The old-fashioned farmer would not have listened to any college professor who attempted to "show him" how to run a farm more successfully. Why, a boy just naturally grew up a farmer. If it was a well-managed farm, he too, grew up to be a successful farmer. If, on the other hand, he happened to be born on a ramshackle, run-down farm, that was his ill luck. There was nobody to teach him better methods. Then if his farm failed to pay, he said it was because his land was poor; if the stock didn't thrive and the cows gave a poor yield of milk, something was the matter with the cows, and nobody could help it.

POSITION OF FARMER CHANGED.

The farmer of fifty years ago struggled single-handed against the soil, against the elements, against lack of transportation facilities, against inadequate plows and reapers and carts. There had been no improvement in farming in over one thousand years.

In Indiana they had eighteen million bushels of corn, an increase of 3.0 per cent over the year previous. They told me that in 1915 they had twelve billion bushels of wheat, an increase over the previous year, but I am proud to tell you to-night that you had 376,164,000 bushels of corn in Illinois. [Applause.]

Now, what used to be the average corn yield per acre, about 25 years ago, they tell me was about 29 bushels to the acre, to-day it is 37 bushels all over the State of Illinois. In Macon County it is about 57 bushels to the acre, isn't it? Now then, there is also that little boy down at Bloomington who raised 176 bushels of corn, and that other boy, Herman Ruger, who raised 145 bushels of corn to the acre. In other words, you are raising more corn to the acre and you are doing more in your own line than was ever done before.

Most important, the position of the farmer has altered marvelously. The farmer used to be the hardest worked and most poorly paid laborer. To-day he stands as an emblem of prosperity among business men. You work fewer hours, you take life easier, you have a larger bank account, you use machinery more, you drive your own automobile, you buy more house-furnishings and perfumes and canned music per capita than the man in the city.

Who do you suppose buys perfume? Why the boy of our farm he buys the perfume. Who buys the canned music and automobiles? The farmers. The farmers, not the city man; he cannot afford it. [Applause.]

SIX GREAT CHANGES.

When I discovered this great jump in farm prosperity and how life had been made so much easier for the man on the farm, I wondered what had been the cause, and also why farm women still complained of the hardship of their lives. I found that there were six great changes that had revolutionized farm management and brought about this era of "the new farming."

1. The improved transportation and road facilities.
2. The use of improved machinery, methods and implements
3. The establishment of state agricultural schools.
4. Cooperation from the Government's Department of Agriculture at Washington.
5. The formation of cooperating farmers' organizations, their meetings and demonstration work.
6. The open mind of the modern farmer.

And this last change may be the most important. The modern farmer of to-day is willing to experiment, to try new methods, and to take the advice of scientific agriculturists.

I saw, then, that the chief reason for this wonderful era of the "new farming" is that you, the farmers of 1916, are no longer struggling single-handed. You are no longer without sources from which to obtain reliable, scientific and technical information. The government will help you in your problems no matter whether you live here in Macon County, or in Seattle, Washington, or in Penobscot, Maine. Farmers and investigators in other states join with you to exchange experiences. Your sons can receive the most advanced training in successful farming methods. You do not work nearly as hard as your grandfather, and yet, with your twelve billion bushels you are feeding the world. You are the man of the hour.

HOW ABOUT THE FARM WOMAN?

How about the farm woman? Is she the woman of the hour? Has your prosperity lightened her labors? They told me to-day that those conditions are all different in Illinois, that we have no poor farmers, that we have no poor homes, that we haven't a single home in the State of Illinois that you can go into where they have no single labor saving device. All of our women are satisfied that there are no such conditions existing. I am glad that they stick up for you, I am glad it is so with this splendid group of men. But here, I cannot help it, there are some sections in Illinois where women are just a bit discouraged, because here are three or four letters, I got a couple of dozen of them, that have come to me from women in Illinois.

"What we country housewives need is some means of lessening the continual grind necessary on the average farm, such as the house sweeping generally done with a hand broom, the laundry and ironing done by hand mostly, and to receive the improvements in heating and lighting which means so much care to the farm woman.

"The average farmer's wife is unable to devote her best energies to the bigger problems of farm housekeeping because she is obliged to be nothing else but a drudge. The farmer's wife is so overburdened that farmer's

daughters are looking upon farm life with a shudder and taking up work in town if they possibly can."

Another letter reads: "We do not feel so much neglected by the government as by our own men. In many farm homes, even among quite wealthy farmers, the women must still do the work as their mothers did before them. There are no modern conveniences, and often not even such inexpensive things as oil-stove, washing machine, breadmixer, etc. Yet the men have all the modern machinery and farm implements their work requires. We think these conditions exist not because men are careless or unkind, but because they do not realize how much work their women have to do, nor how important the farm woman's work is. Nor do they realize how much time and strength a woman could be saved."

Here is another letter: "Isolation, ignorance, loss of ambition, excessive grind of labor, and the lack of time for improvement, either by reading or social intercourse, are all working against the farm woman's happiness. We need help to change the outlook, to show us how to do the monotonous tasks in a spirit that keeps them from being drudgery. Too long days is the trouble on the farm—5.30 a. m. to 9.00 p. m., and always so monotonous."

These letters were sent to the Department of Agriculture and may be found in four reports numbers 102, 3, 4 and 5. You can get them if you want to. And there are personal letters coming to me almost every day from women in Illinois, farm women who want to remodel their kitchen and want to find easier ways of doing their work.

I find my message is not useless because the farm woman of Illinois has not kept pace with the farm man. Unlike her husband, the farm woman is still struggling against the same old conditions against which her grandmother too, struggled single-handed.

Just as the farm boy of long ago was expected to naturally grow into farming, so it was expected that the girl born on a farm would "just naturally" grow into housekeeping. If her mother happened to be a good cook, or a model housekeeper, or a fine hand at butter, that was Sally's good luck. But if she were the daughter of a shiftless, ignorant mother, Sally simply followed in the same steps.

Who was to train her or show her the way? If her bread was soggy, or her "jarred" tomatoes didn't keep, the neighbors agreed that she didn't have the knack and nobody expected she would acquire it. If, when she married, her baby was puny or rickety, or four out of her eight children died, it was all because they were born sickly, and it was laid to the will of the Almighty.

DIDN'T SAY MUCH, BUT KEPT GOING.

Remember too, that when Sally married a farmer, she was married to the farm as well. It was taken for granted that she would assist with the dairy, the poultry, and sometimes she even raised, gathered and took produce to market with her own hands. On the side, as it were, she bore children, kept house, washed for and boarded several hired men.

She didn't say much, but she did the work. Indeed, the farm woman reminds me very much of the lady who made the first American flag, according as a schoolboy told it. The teacher to create interest, asked the class on George Washington's birthday to write an essay on the making of the American flag, and little Tommy made a play out of it. And here is his play:

First Scene: Curtain rises. A private soldier enters from the left of the stage; a captain enters from the right. The private salutes the captain and says: "Gee, aint it fierce that this Constitution aint got no flag." The captain says, "My, it is fierce." The private salutes again and exits to the left; the captain exits right. The curtain drops.

Second Scene: Curtain rises. The captain enters from the left of stage; George Washington from the right. The captain salutes General Washington and remarks: "Gee, aint it fierce that this Constitution aint got no flag." And General Washington agrees, "My, it is fierce." The captain exits left, the general right. The curtain drops.

Third Scene: Curtain rises. It is the living room, in the home of Betsy Ross and Betsy is sitting at work. General Washington enters and says to Betsy Ross: "Gee, aint it fierce that this Constitution aint got no flag." And Betsy replies, "You hold the baby and I'll make one."

Now, just as her husband, fifty years back, fought against the soil and the elements alone, so Sally struggled single-handed against ovens that wouldn't bake, smoking oil lamps, babies that fretted, and one eternal round of cooking and scrubbing. She was even more isolated than the farm man. She was bounded by the four walls of her kitchen. She had no books, even, on her work of home management. She had no chance to discuss her problems with women of more experience and training than herself. As for a school to which she might send her daughters to study house-keeping that was an unheard-of absurdity.

So Sallie went on working, alone, unaided, unstimulated. And Sallie is struggling yet. She has not said much, but she got there just the same.

Moreover, this is the sad part of it, while she was thus working discouragedly, along came the government and the State Agricultural College and said to her husband, "Write me your farm problems and our experts will help you. We'll send you bulletins on how to spray peaches for brown rot, or how to make concrete fence posts, how to control foot and mouth disease in cattle; and how you can construct the most efficient barns and outbuildings."

But, did the government say to the farm woman, "Our experts will help you, too?" "They will tell you all about ranges and fuels and how to cook the roast without cooking yourself as well; what kind of dishwasher to use; how to feed your two-year-old baby, or to set a good table on five dollars a week, and how to arrange your kitchen to save steps?" No, the government did not do that—not then.

And when the agricultural schools started, they were for men only, and showed them how to make the farm pay. If nobody trained a girl in house-keeping could she make the house pay? Why, no. In 1889 there was an agricultural experiment station in every state in the Union, but there is not yet a station for housekeeping experiments. Not until 1915, (thirty years behind) did the Smith-Lever Act, appropriating money to teach farm women, become effective.

AHEAD OF SMITH-LEVER ACT.

Now, I have been finding out a great deal about your work. You know the reports of your work go all over, even though you may not think so, for you cannot hide from the people of the country what you are doing in any given state. You did not have to wait for the Smith-Lever Act in Illinois because you had the splendid Farmers' Institute and the Home Science Department which beat the Smith-Lever Act by twelve years.

Now, another thing; you know that it is true of the farm men and every other kind of man, that he receives the constant stimulation of the group to which he belongs, by that I mean men are gregarious, they are always in the habit of getting together and talking things over, and working things out together. They have done that for all time, and perhaps I could tell a story here which is an example of that. I always have thought that the first original cave man—you know there was a cave man and a cave woman, although we do not know so much about that except what we find in the books, still we can imagine a great deal about them—anyway, I imagine one day this cave man went out and had to get food, because he was the stronger, the male, it was his duty to capture the food; after a long chase he slew this animal and brought it home, and brought it to the cave, but he was not satisfied after he had done that. What did he do? He was not proud to show it to his cave mate, but he wanted to show it to the other boys, he wanted them to know about it. And he went out and rounded up all of the other cave boys and showed it to them, and they said, "You are heap big chief" and they put feathers on him and they painted their faces and they had a party because that man shot that buck. And then he said to his wife, his mate, cook it, and she put little herba in it

and she washed it and covered it up with grass and basted it and took care of it during the long slow hours, but, do you think she went off and got twenty women to see what she had done? No, she did not. [Applause.]

You men are egotistical. You cannot do one little thing but what you want the other fellows to know about it, and to crow about it. That is what you have been doing all along. I think it is splendid, and I think the stimulation and praise you get from your own group are the finest things in the world. We are just beginning to find that out. We are just beginning to find out that we cannot work single-handed, that we can work together better.

THE ECONOMIC PUNCH.

Another thing you men have had is the economic punch, as they call it; as you have to make good in your work. Society expects the man to support the family, always expects it, and for that reason you work. If society did not expect it you would not work. A great many don't work now, even when society does expect it of you. We have not expected quite so much of the women, because as a rule people did not know what she was doing, whether she was a good housekeeper or not did not effect the community to any extent. Those two things you have, the economic punch and the admiration of the crowd. Something that the woman never has had. As I say, the farmer has always found time to leave the farm and attend these meetings of growers or breeders, but everybody agreed that mother was too busy, and that the horses could not be spared, and then again who would do the cooking and cleaning and washing and taking care of the children while she was away. But thank God for the Ford which mother can drive.

I want to tell you what happened to me in Virginia. Last year I had an invitation to come down to Virginia. I received an invitation to come down and speak before their Chamber of Commerce. And in preparation I said what has Virginia done? I thought that Virginia was the first great state, that Thomas Jefferson was born there, and that a whole long line of presidents had come from there. I thought of Jamestown and Pocahontas, and all of the things associated with Virginia. I thought to myself what will I see first in the state of Virginia? Will it be the white snowy fields of cotton or what? So I got up the next morning and I said to the porter, "Are we in Virginia now?" And he said, "Yes, ma'am, we are in Virginia." I looked out the window and saw a Ford, and that was the first thing I saw in Virginia, showing the universality of the car. I am perfectly independent, even thou I live forty miles from New York and even though anything we have to buy has to be obtained at a store five miles away.

STRAIGHT FROM THE SHOULDER.

And now I am going to talk to you men straight from the shoulder. You have been helped by the government, by your farmer organizations, and your work made easier by new machinery. You are no longer using the cradle scythe, but the most improved harvester. You no longer thresh with a flail, but with a power thresher, you do not even walk behind a plow if you farm as they do in the great West. You sit down comfortably on a gang plow.

You have bought a corn dump, a riding harrow and cultivator to lighten your drudgery, but did you buy your wife a dishwasher, a fireless cooker or a washing machine? You installed a gas engine to pump water for the stock in the barn, but is your wife still hauling water from the outdoor pump to the kitchen? You will buy a riding cultivator with shade attachment for a hot day, but will you buy a self-heating flat-iron so that your wife can iron on a cool porch when the thermometer registers ninety? You spend money putting in the finest concrete floor in your dairy, but will you spend anything to put a good composition floor or linoleum on the kitchen, so that your wife won't have to get down on her knees scrubbing a splintery wood floor? You may be willing to spend a thousand dollars to send your boy to an agricultural school, but what will you spend on sending your girl to school to take the splendid training given her in home economics?

I make this appeal to men because it is you most often who hold the purse strings, and women are powerless to make investments without your aid. You men must be willing to cooperate in bringing the new housekeeping into your home, just as the new farming has been brought to you, to increase prosperity.

What steps must be taken to bring about the new housekeeping?

1. The use of improved methods of housework.
2. The use of better equipment and tools in the farm home.
3. Special schooling for the farm home maker.
4. Greater cooperation among organizations of home makers.
5. Increase assistance from State and Federal Government.

I am sure that every woman in the audience will agree with me when I say that it is not entirely the hand labor required in daily housework which makes her all tired out, but the conditions surrounding the work.



The Applecroft Experiment Station.

Therefore, there must first be improved conditions of housekeeping before work can be done more easily.

Take the large, roomy kitchen of the average farmhouse, which is often a dining room, washroom and laundry all in one. The stove is at one end, next to it is the sink, and table and pantry across the room. Pantries are twenty feet apart, food is stored down cellar, and the wood is kept in the shed outside. Think of the steps required in the preparation and clearing away of a single meal!

It has been estimated that the farm woman spends eighty per cent of her time in the kitchen, and yet how poorly arranged and inconvenient it so often is. The sink is so low that she has to bend her back until it aches, washing dishes from every meal. The windows are there by accident and are not planned to be where they will throw the best light on work. Ventilation is poor. Pot-closets and dish-closets are too low or too high.

And it would require only a few, inexpensive building changes to remedy these conditions. Jack up the sink four inches. Put a transom

window opposite the door to give cross ventilation. Cover the dirt-catching wooden table with a metal so that it will not need so much scrubbing. Put an ash chute from the range to the cellar so that there will be no carting of flying ashes. Take a hammer and a few two by four strips of wood and make a cook's rack on which to hang utensils. Put a half dozen narrow shelves with the top no more than six feet from the floor, on which to lay pots and pans and dishes, and do away with the step-wasting pantries.

Help your wife make the farm kitchen a well planned step-saving workshop, and lessen the time that she must be incarcerated in it.

Not only must the conditions of work in the farm home be right, but the worker must have the most improved tools and labor-savers if she is to conserve her strength. If a good washing machine can clean the week's clothes in one hour, where is the economy of a splendid woman wasting four hours rubbing the same clothes over a washboard?

Why should she spend an entire morning standing over a hot stove basting a leg of mutton if she can put it in a fireless cooker and leave the



Mrs. Christine Frederick, kitchen expert, at the filing cabinet.

kitchen to take a walk with her children, or read, or attend a parents-teachers' meeting or a grange demonstration?

If a mechanical dishwasher will wash the dishes of three meals in fifteen minutes, why should she spend an hour on supper dishes alone, when she could be having that time with her husband to talk over the broader interests of their work?

Good labor-saving equipment is needed in the home just as much as in the fields. Much of the purely manual work of housekeeping must be given over to the mechanical servant, and the farm woman come to depend on machinery to aid her as much as it has aided the farm man.

With the conditions improved, and better tools and equipment, the farm woman will have time not only for recreation and the higher family interests, but she will also have the longed-for leisure to study books and courses on advanced home making.

For example, although every farm woman cooks, how many have had training in the why of cooking, and the differing nutritive needs of adults

and children in her family? You farmers spend much time studying. You know, for instance, exactly what feeds and mashes are needed for your animals. At this very conference you are having addresses by experts on "soils," "rock phosphate," "feeding" and "feeds."

The study of dietetics for human beings is fully as worthy of attention, and when the farm home maker has time to devote to this highly important subject, her family will benefit directly in better health and spirits and increased work efficiency.

I have heard it said over and over again that farmers are the poorest fed people, in spite of the abundance they raise. The best produce is sold, and the farm woman has not had the training which would enable her to serve a balanced meal.

VEGETABLES VS. PATENT MEDICINES.

I visited recently a prosperous farm, and at one meal we sat down to a table on which there were ham, baked beans, four kinds of pie, and not a vegetable or fruit in sight. All of their garden truck was sold to the city, and the people themselves despised "grass" as they called spinach, lettuce, swiss chard, etc. But I learned that that family spent a good sum yearly on pills and powders, and it is a known fact that the patent medicine industry in this country is supported by the farmer. Doan's kidney pills, Swamp-root, Stomach bitters, and Peruna have long ago been expelled from the good metropolitan newspapers and national weeklies. But where do they still thrive? On the pages of the best country weeklies. These medicines would not be needed if the diet were more healthful—as it would be if women understood better and had time for training in the science of nutrition. I want you to use your influence to get honest advertising in your country papers. No reason why a man should take a paper that says things in its advertisements that are not true, any more than he has the right to break into your home.

The country home maker must find time for other subjects of study too; home sanitation, care of children, how to make laundry work easier how to buy for and arrange the furnishing of the farm home. With these new housekeeping methods, farm work will be so much easier that it will also give the farm girl a chance. She will be able to be spared and not made a house drudger so early, but will be able to choose the work she would like to do and attend a school to get training.

BOTH MUST BE CONTENTED.

"Boys back to the farm" is not so important as "girls back to the farm." The girls go to the city, the boys follow. To make the farm boy contented, you must make the farm girl contented.

Illinois is fortunate in being able to boast so progressive an organization as your home economics association, and also a splendidly organized extension work among home makers, for not many states have such cooperation between the farm women. It is by spreading and increasing the number of such organizations—cooperation between states as well as between counties, and interchange of progressive plans and methods for improving home making, that a better day will dawn for the country home maker. Nothing is so stimulating as to know what someone else in the same field is doing, what they are finding out, to compare problems and work out together their solution. The night before I left home to come here I received a bulletin from Cornell University telling about the wonderful success of the farm demonstration schools for girls in New York State. More of such schools, of grades, of classes, will at once remove the drudgery and loneliness of which the farm woman justly complains.

I see more in the future. Just as the State now supports an agricultural college and experiment station, I see a housekeeping experiment station supported by the State. It shall have a model equipped farm home, tests of food, devices, furnishings, for farm information.

And lastly, the new housekeeping will mean closer cooperation between the government and the farm woman. Only half a dozen bulletins out of the hundreds printed by the Department of Agriculture are for the specific help

of the home maker. The Children's Bureau has been started only recently and only one paper on the care of the child issued.

But there is need for greater information, particularly on the choosing and use of machinery in the home. What is the cost of operating a coal range versus a wood stove, or oil or gas? What type of washing machine is best? What is the best refrigerating plant, or what metals are best for special equipment? How can a small motor be used in connection with a washer mangle, freezer, etc.?

These are some of the problems which the government and state should experiment with and give the results to the farm woman. Too often she is the dupe of itinerant agents who palm off on her labor-savers that don't save labor, simply because she doesn't know mechanical principles, and therefore can not distinguish between well-made and clap-trap devices.

When you consider how little encouragement the farm woman has received from any direction, how very often in her unguided efforts to ease housework she has been taken advantage of by unscrupulous dealers in devices, how she has lacked stimulation and hope of ever improving her condition, you cannot blame her for saying often—as many of my correspondents say in their letters to me—that they wish they could run away from it all.

And the last, but most important idea I would leave with you is, to encourage a more cheerful mental attitude on the part of the country home maker. She can master housework instead of letting it master her.

NEED FOR WIDE-OPEN OUTLOOK.

But the idea I wish to strongly leave with you women is this need among women for a wide-open outlook, for the right mental attitude about housework. I want women to feel that by following these new methods and solving complex problems, they are working side by side with other investigators in industrial and scientific fields. Think of the discoveries you might make in cooking, in spending money, in using fuels in a different way, by inventing some home-made device or labor-saver, some arrangement of tools, which if passed on, could be of untold help to countless other home makers. Make a laboratory, a testing station of your own home, feel that what you are doing is exactly on a par or even above what domestic science workers and teachers are doing in schools and colleges. Above all, discard tradition, and work for the new housekeeping.

Assume the mental attitude that you couldn't possibly do anything more important than you are doing. Think of your work constantly as big and valuable, and it will become so. No work ever could become dignified or successful if it constantly appeared mean and lowering to the worker herself.

And to men, to husbands and fathers and brothers let me say, you too, assume this attitude toward housekeeping, that it is just as much a business as your own work of agriculture. Don't speak slightly of it as "woman's work" and believe that while you are able to apply business and science and equipment to the farm, that your wife cannot also apply training and business and machinery to housekeeping.

The benefits of this new stimulating attitude toward housework will be felt not only by the woman herself, but by the husband and the family and the state. How can the woman to whom her work is nothing but an incessant grind be a fit companion for a husband who is progressing, and whose work, though hard, has not left him dulled and without interests? How often is it true that children leave the farm because the "old folks" are behind the times and out of sympathy with them? And because the overworked farm woman has no time from her house routine, the community loses her needed cooperation.

COOPERATIVE COMMUNITY SPIRIT.

Much more than the city woman, the farm woman has need to share community interests. There is the rural school and its problems; the need that the farm woman belong to a parent-teacher association and give her support to raise the standards of the rural school. There is the large

question of country sanitation which means so much to the homemaker and her children and which has been neglected so long in many districts just because the woman has not been able to give the time for its agitation. There is the problem of better distribution for farm products which affects the farm woman, and her eggs and butter and small fruit products as well as it affects the larger crops of her husband. Good roads, too, means of wholesome social diversion, the increase of cooperative community spirit, are all interests which the farm woman must work toward and in which she must take an active part. But she cannot find time to take this part if her housekeeping is tying her hands with drudgery.

Therefore, the crowning part of the new housekeeping is, that it not only means greater personal leisure for the farm woman, but time in which to share in the upbuilding and prosperity of the community in which she lives. Farm living is successful not in the amount of dollars and cents the farm produces, but in the breadth of living and rounded out culture and happiness that country dwellers have in their own lives. The sooner the farm woman has time away from her individual housekeeping to share in community housekeeping, the sooner the surroundings and standards of the farm home will be elevated, and its prosperity increased.

The new housekeeping means scientific dignified effort instead of traditional backbreaking drudgery; the new housekeeping means leisure time for training and self-cultivation for the farm woman; the new housekeeping means a more contented, educated, companion for the farm husband and country children; the new housekeeping means a better serving of the country community and the development of the highest standards of country life. [Applause.]

PRESIDENT TULLOCK. I wish to announce that for Wednesday morning the Department of Household Science program will be given in this church and that the Institute program will be given in the high school auditorium which will include the demonstration by Prof. Gilbert. Hon. Charles Adkins will speak in the afternoon taking Prof. Gilbert's place.

Adjournment taken to Wednesday morning, February 23, 1916.



WEDNESDAY MORNING SESSION.

High School Auditorium, 9 o'Clock.

HON. GEORGE F. TULLOCK, Presiding.

Music, Selection.....High School Orchestra
Invocation.....Rev. James W. McDonaIs

PRESIDENT TULLOCK. I am pleased to see so many here. On account of the change in our meeting place I was afraid our audience would be somewhat diminished.

Systems embracing live stock farming in Illinois are being recognized more and more every year by our farmers as one of the great aids in the maintenance of soil fertility. The live stock situation has become acute in this State and we are glad we have with us someone who will give us information on the situation and we are going to listen to an address by Prof. H. W. Mumford of the University of Illinois, who will address us on "The Live Stock Situation in Illinois." [Applause.]

THE LIVE STOCK SITUATION IN ILLINOIS.

(Prof. H. W. Mumford.)

MR. PRESIDENT, LADIES AND GENTLEMEN: It was six years ago this winter when I undertook to present to the Illinois Farmers' Institute the live stock situation in Illinois.

Basing our judgment upon the most dependable statistics I have been able to secure, I find that in the United States, Illinois ranks second in the production of horses; fourth in the production of mules; fifth in the production of cattle other than milch cows; fourth in the production of cows; seventh in the production of sheep; and second in the production of swine. Illinois ranks third in the total value of its live stock. On January 1, 1916, the estimated value of live stock in the State of Illinois was \$332,911,000, being exceeded only by the states of Texas and Iowa.

In the production of pedigreed live stock, Illinois holds about the same rank as in the production of live stock for the open market. In comparing all classes of pedigreed live stock bred in Illinois, horses rank highest, with swine, beef cattle, dairy cattle and sheep in the order named.

It is the opinion of the writer that Illinois should always command a leading place among the states in the breeding of pedigreed live stock; quite likely it may not produce the largest quantity of pedigreed live stock, but it could very properly aim to produce the highest class and lead in questions of type and standard.

In a paper read before the Illinois Live Stock Breeders' Association on the subject, "The Value of a Pedigree," the writer made some statements which I wish to repeat here.

"Probably the breeders of Illinois stand as high, or higher, in the estimation of the general farming public than those of any other state, but there is still room for improvement and if we are really in earnest about occupying in the pedigreed world the commanding position to which Illinois, both from her traditions and her strategic geographical location, is entitled, we may as well recognize that the establishment of a reputation for unvarying rectitude is of fundamental importance. I do not need to go into details with you gentlemen and explain that there are too many deals put through that would not bear close inspection or publicity.

"I will go further; I believe that breeders of pedigreed live stock are on the eve of the greatest successes they have ever been privileged to witness,

but I just as confidently believe that there is developing an awakened conscience for better, cleaner business methods which surround this industry. This awakening has been very noticeable in many lines of business; it has been slow in dominating the live stock trade, but it is surely on its way. If I took the sordid viewpoint of believing that this awakening is not coming and fortified my position with the statement that it has always been otherwise and will therefore always continue to be so, then I would aptly be called a pessimist, but because I do believe that a better day is dawning for the live stock breeder than he ever has enjoyed, I am an optimist. Let me say further, so thoroughly do I believe in this that if I could I would warn every breeder who believes that the degree of success, even financial success, is determined by the ability to put over crooked deals and get away with them, that his days are numbered and that quite another type of breeder will dominate the future."

It may well be asked if there is a legitimate and reasonably open field for the development of more breeders of pedigreed live stock. No one would



Products of Walnut Ridge Farm, Sumner, Ill. Jersey calf from Hood Farm stock at 10 weeks of age.

question the opportunity for improvement. When we know that only about 400,000 animals were registered last year out of approximately 200,000,000 bred, it would seem that there is ample opportunity for the development of the pedigreed live stock industry along proper lines. There is undoubtedly much to be done in bringing the general stock farming public to a proper realization of the importance of better live stock. If this could be done, it would insure a better market and more stable prices.

Quoting again from the paper referred to, "The Value of a Pedigree," "Not a few farmers, and even breeders, have expected too much of the pedigreed animal and have failed to appreciate what an important place proper development, brought about by liberal and judicious feeding, has played in the development of improved types. The farmer who is not a good caretaker and an intelligent and liberal feeder is likely to be disappointed with the results he secures from his investment in pedigreed animals. Just here is where the breeder should rise to his opportunity and advise the inquiring farmer or breeder as to the best methods of feeding. Let no one imagine,

however, that the breeder of pedigreed live stock has nothing to learn about feeding or breeding from progressive farmers—quite the contrary.

"I wonder if, as breeders of pedigreed live stock, we appreciate the service rendered to the pedigreed live stock interests by the more progressive live stock farmers of the country, the men who are producing live stock for the open market? Men of this type are usually careful buyers; they have a pretty definite notion of the type of sires that have given them the best results. They are rather insistent on securing this type and in a majority of instances quite willing to pay a price in keeping with the value of the animal selected. They are not infrequently better judges of profitable types than breeders themselves. The wise breeder will study with care the type from which the progressive meat producer insists he gets the best results."

And again, "There would be a much larger sale of pedigreed live stock and, on the average, at better prices, if breeders would exercise more care in standardizing both the animals they offer for sale and the prices at which they are offered. Granting that such standardization is desirable, the writer recognizes the difficulty in bringing it about. It is the privilege, and if I may go so far as to say it, the duty of every breeder of pedigreed live stock to do what he can to raise the standard of excellence among pedigreed live stock. The pedigreed scrub should be frowned upon whenever and wherever it appears.

"The problem becomes more difficult because as it stands now, each individual breeder is fighting his battles more or less alone. It is refreshing to find here and there a man who has weathered the various vicissitudes, including the financial ones, which seem to block the way; he stands as a living, shining example of what is possible. He has arrived at a point where his stock, because of its demonstrated worth, is in strong demand and at very satisfactory prices. Let no one complain because he is obliged to pay such a man a premium to secure breeding stock from him; let him rather recognize that he can well afford to pay a premium for the privilege of buying out of such a herd. To be sure, he is obliged to pay more; but, in the end, he gets more. However, I am inclined to believe that in this country there is not yet enough distinction made between the price of the high class stock of proved ancestry, sold by reliable and dependable breeders, and mediocre stuff exposed for sale by mere multipliers."

We can not afford to lose sight of the fact that there is a real place for pedigreed live stock and the breeders of improved stock. It must be admitted, as has been said before, that there has never been the fullest understanding between the breeder and the farmer, and their mutual interdependence. This is one of the problems to be worked out in the future and there is no better place to begin than in Illinois. Wherever intensive methods are necessary because of higher cost of land and labor, there must be a corresponding increase in the value of the product. It is always true, speaking generally, that a high-class product can be produced under the intensive methods. All these conditions point to a larger interest in the breeding of improved live stock.

It may be profitable to spend a little further time in reviewing some of the problems of the meat producer in the corn belt. Just as it is impossible to discuss, in any broad way at least, the live stock situation in Illinois without involving the corn belt, so it is impossible to discuss live stock production in the corn-belt without at least recognizing that there are problems which are not primarily corn-belt problems and which do have a more or less direct bearing upon live stock production in this region.

The fact which stands out most prominently in the mind of the general public is that there is a gradual, but sure, tendency toward higher prices for meats. In some quarters there is an inclination to rebel against this condition and various methods have been suggested in an attempt to check this tendency for meats to rise to a higher level. There is perhaps no other question touching directly upon the food supply of the people, concerning which there is a greater amount of ignorance than upon this question of the price of meat. Within the memory of even young men, the

price of meat has increased from a point where it was available to the poorest family to a point where it is of necessity, partially or largely, eliminated from the diet of the poorer classes in this country. Every factor associated in any way in the production of meat has at one time or another been blamed for these higher prices. This is not to be wondered at because it must be remembered that the public at large never appreciated the fact that for years the people of this country were provided with a food supply so abundant and so cheap that about the only factors in its production that were really paid for were cost of labor and transportation involved. Free lands or cheap lands were to be had almost for the asking and labor was cheap because it was seeking a market. These conditions have now changed.

CONDITIONS HAVE CHANGED.

The rapid increase in population has brought about a tremendous increase in the demand for foodstuffs. The cheap, fertile lands have been exploited and are no longer available except at much increased cost. Manufacturing has increased to such an extent and the demand of labor has been so keen that they have forced the wages of the farm laborer to a higher level as well as wages in other enterprises. The business of meat production has passed from the free and unlimited ranges and the cheap fertile lands of the Middle West to smaller ranges of restricted area and poorer grade, and high priced lands of the corn belt. It seems to be inevitable in every important agricultural country, at a certain stage of its development, that there is a tendency for grain growing to crowd out and supplant live stock production. This result has been normal and logical since it has been possible for the grain grower to sell his crop to the elevator or mill for a higher price than the live stock producer has felt warranted to pay. It appears that grain rather than live stock first shows the upward tendency of prices, and it was not until a grave shortage of beef cattle in the United States became evident that the prices for fat cattle appreciated sufficiently to stop the rapid reduction of the supply of beef cattle in the country.

I have felt it necessary to make this explanation before declaring that the time is ripe for the public to reconstruct their point of view with reference to prices of meat. No one needs to look forward with confidence to an era of cheap meats. Such a condition is possible only where cheap land and labor and a very restricted demand, as compared with the supply, obtains. Prices for fat cattle in the great central markets in the United States to-day have not been sufficiently high to encourage beef production. It should be evident to anyone who will give the matter serious thought that this fact is largely responsible for the present shortage of beef cattle in the United States.

It is of interest to state briefly the consumption of meat per capita in several of the leading countries, which is as follows:

	Pounds.		Pounds.
United States	182.6	France	79.0
Australia	263.0	Denmark	76.0
Canada	129.0	Belgium and The Netherlands	69.0
Great Britain	121.8	Italy	46.0
Germany	108.0		

Entirely independent of the question of the desirability of meats forming any considerable portion of the diet of man, the economic principle of conservation of our land resources in the United States imperatively dictates that we should not lose sight of the large areas in this country primarily and only suitable for the production of live stock.

According to the thirteenth census of the total land area of the United States, but 25.1 per cent was improved and but 40 per cent of this improved area was used for the production of cereals. In other words, approximately 10 per cent of the total land area of the United States is producing cereal food. Of the remainder, 3.8 per cent is in tame grasses and forage and 1.7 per cent in cotton, while the remaining 9.6 per cent of improved and 74.9

per cent of the unimproved land must be used for other purposes. Large portions of this unimproved area are being used, and can only be used advantageously for grazing purposes. Nineteen per cent of the total land area is nontillable but valuable for pasture, and to a less extent for fruit growing. Then, too, the forages produced in the growing of cereals, tame grasses and legumes, and the permanent pastures are dependent upon animals for conservation into food for human consumption. Of the improved land, 40 per cent of which, as has already been stated, is now being used for the production of cereals, slightly over one-half, or, to be exact 20.6 per cent, is used for the growing of corn; 7.3 per cent for oats; 9.3 per cent for wheat; 1.6 per cent for barley; .5 per cent for rye; .2 per cent for buckwheat .5 per cent for miscellaneous cereals; or, a total of 40 per cent. Of the remaining improved land, 15.1 per cent is used in the production of hay and forage and 6.7 per cent is used in the growing of cotton. To make these figures more expressive, it may be pointed out that of the total cereal acreage in 1909, 51.4 per cent was in corn; 18.4 per cent in oats; and 23.1 per cent in wheat; the remaining 17.1 per cent was made up of barley, buckwheat, rye and rice.

These figures are significant because it can readily be seen that but a relatively small percentage of what might be called the cereal area is devoted to the production of grain which can be, and is, rather directly converted into human food; the larger part of it is employed in growing grains which are primarily suitable for live stock production.

Pursuing this general thought further, it is interesting to note that but a small portion of the cereals other than wheat are used for human consumption. It is estimated that 3.4 per cent of the corn produced in the United States is used directly for human food .9 per cent of the oats; .7 per cent of the barley; and approximately 75 per cent of the wheat. Note that 25 per cent of the wheat is normally by-product in the form of bran, middlings, and similar products largely used in the production of animal food. It should further be pointed out that frequently considerable quantities of wheat are not suitable for milling purposes but must be used for the production of meat. Lack of time prevents a development of the important fact that without live stock in the corn belt, and for that matter throughout the country, there would be a great economic waste of by-products of grain growing in the way of roughages, and the by-products of mills using large quantities of cereals for manufacturing purposes.

The demand for farm products for the production of meat is a very considerable factor in the grain market. This fact is of most importance and can be most strikingly brought out by taking corn as an example. Approximately 80 per cent of the corn produced in the United States is converted into animal products. It may be best for corn-belt farmers who grow corn primarily to keep this fact well in mind when advocating the elimination of live-stock from systems of farming in the middle west. The effect that such a change of practice might affect in the grain market can only be conjectured.

It has become a well-established principle of good agriculture that rotation and diversification of crops is desirable, particularly as it has been shown that where arable lands are primarily devoted to the production of cereals the frequent growth of legumes is imperative if any semblance of an attempt to maintain the fertility of the lands is kept up. Those familiar with movements intended to inspire more rational methods of agriculture which look toward the maintenance of soil fertility, appreciate how difficult it is to interest the average farmer in improved practice which carries with it the maintenance of soil fertility. When it is advocated that soil fertility can and should be maintained by plowing under abundant and seemingly valuable crops of legumes like clover, it does not strongly appeal. On the other hand, if it can be shown, as it has been shown, that these crops can be converted into valuable live stock products with but a fractional waste of its fertilizing value, a long step has been taken toward inaugurating rational systems.

PRESIDENT TULLOCK. If there are any questions you wish to ask Mr. Mumford, he will be glad to answer them. (No response.)

In our general recognition of the importance of the live stock industry in Illinois, there is one department that we are liable to overlook and that is poultry. I am glad to say that we have with us this morning Prof. J. P. Gilbert of the Southern Illinois State Normal University at Carbondale, who will address us on "Profit and Loss on Farm Poultry." [Applause.]

PROFIT AND LOSS ON FARM POULTRY.

(J. P. Gilbert.)

MR. PRESIDENT, LADIES AND GENTLEMEN: The topic for our discussion this morning is of vital interest to every citizen of the commonwealth, either as producer or consumer, or both, since as consumer or producer or as both, all of us are vitally interested in poultry and poultry products. The monetary value of poultry and poultry products in the United States is larger than most of us recognize. While the wheat industry in this country is large and is considered important enough to find a place upon our Farmers' Institute programs, and in our agricultural teaching, still the poultry industry of the country vastly exceeds in dollars and cents that of the wheat production of the country. If, therefore, measured in terms of dollars and cents wheat is worthy of a place in our discussions, by the same token, poultry subjects are worthy of discussion.

There certainly is no farmer who will take up poultry raising with the idea in mind that it is a "get-rich-quick" scheme. If there is such a farmer he is doomed to disappointment and failure, and I am sure that he deserves the failure which will be his. I am sure that in these days the farmer does not expect to reap fabulous rewards for shiftlessness and small efforts. Only those efforts which are worth while are expected in these days to give adequate returns. The lazy, indolent and ignorant farmer need not expect to succeed with poultry, any more than he does with live stock or any other type of farming, but for him who applies reasonable industry and intelligence in the application of modern methods of poultry raising—to him the industry will afford adequate and highly satisfactory returns.

One of the first questions that arises in the mind, I am sure, is what variety of poultry is most profitable. At the breakfast table this morning I was asked, "Which is the most profitable variety?" There is no most profitable variety of poultry to fit all conditions and people. In general terms, that variety in which you take the greatest pride and that which you like best, is the most profitable for you to raise. Not only is the selection of a variety of importance, but likewise the care of the poultry after selection is perhaps of equal or more importance than the selection of the variety.

There are productive and nonproductive strains in all varieties of poultry quite as much as in dairy cattle. You can, therefore, by getting the right strain from a reliable breeder, get birds which ought to be profitable in practically any variety. The reason why you should select that variety which pleases you is because you will give it the best care, and good care is of vital importance.

I do not know of any other branch of live stock that will come so near paying its board for the privilege of boarding with you as poultry will, but not even poultry will succeed without care. Therefore, select the best strain of your favorite variety that you can possibly find, buy from a reliable dealer, and don't be afraid to pay a reasonable price. Certainly a ten-dollar bird will be cared for better than a ten-cent bird will be. Human nature is so constituted that it cares but little for cheap or inferior products and it prizes those things which cost some sacrifice.

SELECT VARIETY YOU LIKE BEST.

Just as I advised you to select that variety which you fancy most, I select the variety which I like best. But that which I fancy and that with which I think I will succeed may not please you at all. You may not succeed because your own individuality enters so largely into the matter. For the chickens, I prefer the Anconas. They may not be the ones you prefer at all.

I may succeed with them when you succeed far better with Andulasians or Leghorns or Barred Rocks or any of the other birds. So I don't urge that you should select my variety, but I do urge that you have a choice and to have a well-defined reason for your choice, just as I have a choice, and then to select the best you can get in that particular variety.

But, while there is no one best variety there are certain principles that ought to guide us in the selection of our birds. We have certain well-known types such as the Mediterranean birds, including Anconas, Leghorns and Andulasians, etc. Then we have the general purpose fowls or American class including Barred Rocks, Rhode Island Reds, Wyandottes and birds of that type. Then we have the English class such as Orpingtons, which are not very much different from the American type. The Mediterranean breeds are made up of small, highly nervous birds, capable of foraging a good deal, and naturally consuming a smaller amount of feed. That fact, in itself, I believe, is a good thing in birds. The Mediterranean type produces of course, the largest number of eggs. Again, the Mediterraneans being smaller birds, occupy less space for housing, and the housing is less expensive than for other classes of land fowls.

Because they are quick and active, the Mediterraneans pick up more destructive insect pests than do other breeds of chickens. Some say they fly like a quail, but that very fact is one of the things to be urged in their favor. Insects play a very large part in the economy of our farm life and if we can get any bird that destroys a larger number of insects we are just that much ahead.

Now, for the Illinois farmers in general, I think the egg production must be our chief aim in rearing poultry. Of course, near the large cities where one can build up a specialized market for broilers and roasters, the Asiatic birds may be highly profitable, as for instance near the large eastern cities where farmers build up personally a special market that will yield sixty to seventy-five cents a pound for birds in the right condition. But for those of us who cannot do this, and that means nearly all of us in Illinois, I certainly think that egg production must be the most profitable end of the poultry business. As I stated a few moments ago, I fancy the Anconas, such as this bird. (Demonstrating with a bird.) I like the appearance of this bird. They may not seem beautiful to you, but they are to me. They are one pound heavier than the Leghorns but they do not look it. I like the appearance of these birds and I like their disposition.

They are more gentle than Leghorns and for me they have shown less disposition to fly. When raised in the same flock and under exactly the same treatment with Barred Rocks, Orpingtons and Rhode Island Reds, my Anconas are invariably the gentlest of all. I don't know whether I am particularly fortunate in this respect or whether that is universal.

—9 F I



Fig. 1. S. C. Ancona cock. An excellent egg type. First at Illinois State Fair.

Of course, on the city lot they do not get as dirty in appearance as white birds do. I like them for that reason. For me, Anconas have produced more eggs than I have ever been able to get Leghorns to do, but this does not mean that you cannot do just the reverse. I like this particular kind because it has a rose-comb. I like the rose-comb birds better than the single-comb because the comb freezes less in severe weather. The single-comb birds with large combs and wattles, especially the males, will get the wattles wet in the drinking fountain and then comb and wattles will freeze on the bird. Of course, with the female, this will put back the egg production in winter when eggs sell high. I like the rose-comb variety for that reason better than the single-comb variety. I prefer the rose-comb birds even in Reds or Orpingtons.

This bird also illustrates some other points I want to talk about. While she is a pretty good exhibition bird, I did not select the bird for exhibition qualities alone. I selected them for another thing, which I will mention later. This is the first pullet at the Illinois State Fair this year. I do not see any reason why the farmer should not have birds from exhibition strains. They will produce quite as well as though they were not exhibition strains. If he can get them, he buys breeders for his herd from a man that has not been afraid to enter animals in the show ring. I do not see any reason why he should stop when selecting poultry.



Fig. 2. Fawn and white Indian Runner Drake-Headed first pennant at Panama-Pacific Exposition.

her out again. The male has perfectly bright yellow legs, as bright and yellow as you ever saw. There is one unfortunate thing; some breeders have birds with dark legs. Birds with yellow feet and yellow legs are more desirable on the market. There is no occasion for getting any Anconas with black legs.

Again, we must not stop by simply considering chickens when discussing the question of profitable farm poultry. We must consider water fowls, for it is my belief that there is, by all odds, the most profitable portion of the poultry industry. I am not an advocate of supplanting chickens with water fowls, but I am quite sure from my own experience that there is far more profit in the water fowls than in chickens. Now, in the water fowl, there are egg laying types and meat types, just as in the chickens. The Pekin duck, of course, has been long known and its profits are well established, but the Indian Runner Duck, the new duck, has a number of things to commend it. I want to talk a little about this new fellow. (Displaying a fawn

Q. What is the weight of those chickens?

Prof. GILBERT. Four to four and one-half pounds to the female and five for the male, I believe. It may have been changed in the new standard. I am not right certain, just a little heavier, a half pound or a pound heavier than the Leghorn in the old standard.

Q. Is the meat dark?

Prof. GILBERT. No. The legs are yellow, the skin is light or yellowish. Did you notice the pullet? I will get

and white Indian Runner Duck.) These are called the Leghorns of the duck family. They weigh from four to five pounds and are very active. When I turn her loose she stands as erect as a bottle. It is a small bird, highly organized. From my experience I am sure these birds will lay more eggs than anything else which wears feathers. Especially is this true in the winter, when eggs are scarce and prices are high. I am going to dwell on this topic because I feel that here is a side of the industry in which there is an unwarranted prejudice. To me, this bird is beautiful.

This lady is the grand champion, highest scoring duck in the Panama-Pacific International Exposition. [Applause.] She has been here about twenty-four hours and she has produced her egg. This has been laid since she came to Decatur. (Indicating egg.)

RUNNERS ALMOST IMMUNE FROM DISEASE.

Why can I get more eggs from this bird than from any other fowl, winter eggs especially? For several reasons. One of them is that in severe winter weather when the combs of the chickens get frozen, this bird will need only a dry shed where she can go in and sit down on the straw and draw her feet up into this bed of warm feathers which are impervious to water. Consequently, there is no such thing as disturbing her egg production when these severe spells come. My Indian Runners never let up at all in their laying during the recent severe spells. You see, she dips her head in the water and has no comb or wattles to be frozen as the result of the cold water getting on them, and consequently, winter does not interfere with the production of the eggs. You cannot give them disease. Lice will not stay in these well-oiled feathers because they are repulsive to vermin. You cannot give these birds rouse, chicken pox, bad colds or anything of that kind. The only reason I ever had trouble with the Runner is that I let them sleep in wet quarters for a considerable period, and a few of them will get a little bit of rheumatism, perhaps, in one leg. I have had about two cases a year in the seven years' experience.

Q. Does the rheumatism come according to the age of the duck?

Prof. GILBERT. I hardly think so.

Q. I find our yearlings take it more than the two years.

Prof. GILBERT. My birds are yearlings. Out of the flock I had I never had more than one or two a year to show any signs of it at all.

Q. Well, I carried mine out of the field time and time again.

Prof. GILBERT. There must be something wrong in the way you care for them, or something wrong with your strain of birds. Such has never been my experience at all. One of the late bulletins from the Department of Agriculture says that these birds don't stand confinement well. I want to challenge that statement and say that the man who wrote it was not familiar with the Indian Runner duck. One thing that recommends them is that they will stand confinement better than any other.

Q. How bad are they to quack and be noisy?

Prof. GILBERT. No trouble at all when they are fed. They will raise a disturbance when they are not fed well, but I suppose we will do that ourselves.

Q. How about the price of the eggs?

EGGS ARE LARGE, WHITE AND BEAUTIFUL.

Prof. GILBERT. Ten to fifteen cents more than hen eggs during the part of the year. I never got any less for duck eggs than for chicken eggs. However, you may have to find your own purchaser in the local market. You have to teach the people that Indian Runner eggs are not like the old-fashioned Pekin egg. They are not bloody, they are not strong. They are white, large and beautiful. They have as mild a flavor as the flavor of any hen egg you ever ate. You may think you can tell the difference, but you cannot do it. You can fry hen eggs and Indian Runner duck eggs, both fresh, and place them on the same plate and except for the size you cannot tell the difference to save your lives.

The gentleman who was president of this Institute when it met here thirteen years ago in Decatur, with his wife, were recently at my house, and

we had fried eggs for breakfast, and they ate the eggs and did not know the difference between the Indian Runner duck eggs and hen eggs. Towards the close of the meal they said, "You were afraid we would not like Indian Runner eggs. Why didn't you put some on the table." Each of them at that time had a portion of an Indian Runner egg on the plate, because we did not have a hen egg in the house that morning. They could not tell the difference.

Suppose you could tell the difference; let us assume for the sake of argument that you could. What do we use most of our eggs for? For baking. They are not all used upon our plates. Far more than fifty per cent of all eggs are used for baking. Even if you could tell the difference when they are fried, we ought to produce Indian Runner duck eggs for baking purposes. I know a lady in Carbondale who has no superior in making angel cake in the State of Illinois, and she has used literally hundreds of dozens of Indian Runner duck eggs and prefers them to hen eggs for that purpose. I have four neighbors who buy eggs at our house all of the time. Two of those neighbors for eating and baking buy Runner duck eggs exclusively. One of them prefers hen eggs and the other wants an even break. She wants part of both.

Q. How about the feed of the Indian Runners?

A GOOD RATION FOR THE RUNNERS.

Prof. GILBERT. They will eat about the same amount as a hen. My Runners last February, a year ago this month, when I bought all my feed at a high price, cost me 10 1/11 cents per month to feed each bird on the average for the entire flock. You cannot beat that for your chickens when you buy every bit of the feed you give them. The feed should be the right kind; you cannot expect your Runners to lay if you feed them nothing but whole corn. Anybody who does this ought to fail. In the first place, hens themselves will not do well on such feed. The Runners will do as well as the hens, but neither will do well. My ration is two parts wheat bran, one part wheat middlings, one part corn ground by the miller as fine as meal, a half part of beef scrap (good scrap), a half part of ground alfalfa, with some sand and some ground oyster shell. This all well mixed and fed in a rather dry crumbly mash, wet just enough to make it crumbly and not sloppy. That is my ration for the Runners and I found it to be quite a successful ration. If I could obtain it I would add to this ration one part of ground oats.

RUNNERS ARE GOOD FORAGERS.

Runners will forage better than your Mediterranean chickens, they are more active, and they will forage farther. They will come home to roost at night and they will not roost in the water. While a pond is a good thing, it is not essential. They will not produce any more eggs with one. I had a pond made, and with the exception of about twice a year I do not find an egg in it.

This drake (exhibiting) headed first pen at the Panama-Pacific Exposition. Notice the erect carriage, long neck, and broad, straight back. Such birds will get more insects than your chickens because with the long neck and the broad beak they even catch insects on the wing. They are far more expert than any chicken. They can thrust out this long neck with surprising speed and accuracy and catch more insects than any chicken. The flesh is about like that of a wild Mallard.

Q. Do you have your ducks on the range?

Prof. GILBERT. My place is a three acre town lot, and I have an acre of alfalfa and I allow my birds to run on that. In the summer I have various patches of different things and I allow my birds the range of those patches. It is not a farm range, still as near a farm as you will find in the city.

Q. Don't you feed them whole corn at all?

Prof. GILBERT. Yes. It is said to be advisable to feed them just a little whole corn at noon. Their digestive organs are not as well fitted to take care of whole corn as are those of chickens, although the Agricultural Department at Washington advises giving a little whole corn.

Q. How was the egg production last February as compared with the cost?

Prof. GILBERT. I have forty-five female Runners in the flock and for the last month I got thirty eggs or more every day except during the last week when I got thirty-seven per day. The production up to this point is exceeding 75 per cent for the month of February, while for one week in February I had more than twenty birds of the flock in a show. You understand with nervous birds such as these, exhibiting them is apt to stop their laying. The birds averaged better than 60 per cent for the entire flock for the month of January of this year. They lay an egg each day and it is a common thing for a Runner to lay one each morning for a month and even two months at a time without skipping a single day. There is no hen on earth can do that.

Q. Do you find that sometimes, in the morning, they miss a day?

Prof. GILBERT. Yes, once in a while they do that.

Q. And then lay at ten o'clock in the morning, thus laying two eggs within twenty-four hours?

Prof. GILBERT. Yes. If I had not known what I am talking about, I would say this impossible, and I used to make fun of the fellow who said this. I have positive information that on several occasions an Indian Runner duck has laid two eggs in twenty-four hours. Every spring when I separated my young breeders I closed them up separately to determine the exact sort of egg laid by each bird before she was sent to the breeding pen. To do that I shut the birds up in coops, boxes, etc. The next morning I sometimes found two eggs. Sometimes one of these eggs had a soft shell. It is possible in a few instances to find an Indian Runner duck laying two eggs in twenty-four hours.

Q. In regard to the Indian Runner duck, will they produce as well in large flocks?

Prof. GILBERT. Of course, no variety will produce as well in large flocks as in small flocks. They are not any different from any other variety in that regard. Of course, the larger flock you get the less forage they can get and there will be a gradual diminution in the percentage of egg production. It will be a slight diminution unless you get a very large flock. That will be true of chickens or any other flock.

Q. How does the hen ration differ from the duck ration?

Prof. GILBERT. I feed mine the same. That might not be the best way, but I tell you what I would have for this ration, for both hens and Runners if I could. I would make ground oats a part of that ration if I had it. I have not been able to get it at all. I have tried to get it but was not able to do so.

Q. One part?



Fig. 3. R. C. Ancona hen with widespread pelvic bones, three fingers, hen laying.

Prof. GILBERT. Yes, one part and leave the ration as I previously gave it, only adding one part of ground oats.

Q. How about the water, is that muddy or not?

Prof. GILBERT. I don't care whether it is muddy or not. It doesn't make a particle of difference. If it is not muddy they will make it muddy. Somebody may say they are dirty. Certainly, if you keep them in the back yard they will be dirty. Hogs are dirty if you pen them up in the back yard, aren't they? I have not heard anybody objecting to the raising of hogs on the farm because they are dirty. You are raising them because they are profitable. Keep them in a dry shed, open on one or two sides, surround it with a twenty-four-inch fence and you need not have any trouble about their getting over it. I never had one get over a twenty-

four-inch fence. You need no expensive house. I am sure if you give them the right care and the right attention the Indian Runners will give you more profits than any other bird.

Q. Give us that ration again?

Prof. GILBERT. Two parts wheat bran, one part wheat middlings, one part corn ground by the miller as fine as meal and a half part of beef scrap, good scrap, and a half part of ground alfalfa with some sand. The quantity there does not matter so much. You will not give too much. I am sure, and of course, give some oyster shell. If I could get it I would add one more thing, ground oats, one part.

Q. What is the difference between the ground and the whole?

Prof. GILBERT. These birds will not get the nourishment from the whole oats so well because of their digestive system.

Q. Don't you feed any whole wheat?

Prof. GILBERT. None at all to my Runners. Of course, I feed whole corn, whole wheat and whole oats



Fig. 4. White Orpington hen, pelvic bones close together. One finger, not laying.

to the chickens in the straw where they scratch for them. I want them to scratch.

Q. Have you ever tried tankage?

Prof. GILBERT. Yes, I have, but I know that it has interfered with their digestive organs.

There are a good many cows on farms that are eating their heads off in Illinois, and you want to weed them out. It is our business to weed these out. In like manner there are great numbers of unprofitable fowls on the farm, eating their heads off and consuming the profits made by the good birds. We can weed these out and should do so. I know none of you want to sell your laying hens, because if you sell your laying hens you

stop your profits. I wonder if you have ever killed a hen for the table and found her body full of developing eggs. Those of you who have, raise your hands. When you do that you are cutting off your profits.

You can determine whether the hen is laying or not by placing the ends of the fingers vertically between the ends of the pelvic bones. If they are laying or just ready to lay an egg, the pelvic bones ought to be spread three fingers apart or nearly so.

If they are three fingers apart you would better put her down or she will drop it right on the ground. If you find them spread about two fingers apart for a hen of this size she will lay soon. With this hen, you can put only one finger between the pelvic bones and it would embarrass her to talk about laying an egg. This is a Decatur hen. [Laughter.]

If you are going to market them, don't sell the layers. This is the hen to kill, she is not going to lay, she won't lay for weeks and weeks, if she ever lays at all.

Not only this, but there are sometimes birds in your flock that never lay. How are you going to find this out? Here is a point I would like to make clear. If you are going to select a feeder for beef or a dairy cow you examine the abdominal capacity and if you do not find a large abdominal capacity they never take in enough feed to make good feeders. If they do not have large abdominal capacities they will not take in enough feed to make good milkers. Your purpose, then, is to examine the contour of the animal to determine the abdominal capacity, and having determined this, you want to know whether the large amount of feed is going to go into milk or beef and you determine that by looking at your animal. You determine whether it is a good feeder or a good milk type from the contour. You cannot do this with chickens by appearance, but you can by feeling of them. If I select a meat type or an egg type bird, I want one with a big abdominal capacity. I search for a big abdominal capacity, and I do it in this manner. Just below the end of the pelvic bone place your fingers, horizontally, the front finger below the two pelvic bones. With the little finger, find the rear end of the breast bone. (Indicating.)

If the distance between the ends of the pelvic bone and the end of the keel or breast bone is large, say five or six fingers breadth, the abdominal capacity is large. If it is only two or three fingers breadth, it is unsatisfactory. That gives you one of the best tests of abdominal capacity. Of course, the broad chest and broad, long back is a part of it, as everybody



Fig. 5. R. C. Ancona hen seen in Fig. 3. Abdominal capacity very large. Six fingers.

knows. This pullet, at the present time, is a five finger abdominal capacity bird. I want to find out whether she will be more, and I want to find out whether she is fat or poor, I want to know whether she will spread out one or two fingers more. If the bird is poor as evidenced by the sharp breast bone without flesh upon it, she will add more width to the abdomen, depending upon the amount of deficiency in flesh.

A seven finger abdomen is a very rare thing. Six fingers is splendid and the bird having it is a great producer of either eggs or meat. Here is a six finger hen, but she is not fat. I tell whether she is, fat or not by how this breast bone feels, whether it is sharp or covered with meat. Having determined that this hen has a splendid abdominal capacity, I want to know what she does with her feed. Will it be turned into meat or eggs? I will determine by taking the pelvic bone between my fingers in this way.

(Indicating.) If it is thick her feed goes to meat and if thin it goes to eggs. This hen has fairly thin pelvic bones.

Of course, the Mediterranean type has thinner pelvic bones than the larger birds; you have to learn to make allowances for the bird you examine. Here is a six finger pullet. She is laying. She has a splendid abdominal capacity and she does not put a large amount of it into meat. She puts most of it into eggs. She is not as good on thinness of pelvic bones as I would like to have her. This pullet, with proper care, should lay two hundred eggs or better her first laying year.

I have here a hen with abdominal capacity large, very large, that is seven fingers. She has some ovarian trouble that interferes somewhat but this one has a very large abdominal capacity. I want to find out what she does with what she eats. I find the pelvic bones to be very thick, one inch thick. She is a meat producer. This hen has not laid an egg for a long, long time.

Q. Is that hen from Decatur?

Prof. GILBERT. No, that hen is not from Decatur. [Laughter.]

I doubt whether this hen will ever lay another egg as long as she lives. When in her prime she was a splendid show bird.

Here is a splendid egg producer, this Rose-Comb Ancona. I think more of this one than the one that got the prize at the Panama-Pacific. Although she is not so well marked for show points, she is a better bird. Here is another bird of the same breed, Rose-Comb Ancona. She is distinctly of the meat type. She is not the layer that the other one is. This one has a large abdominal capacity, but thick pelvic bones, one inch thick, almost, and the other is not more than one-sixteenth. Everything the other one eats goes to eggs, but with this one, everything goes to meat. I am going to have the



Fig. 6. Breast bone without flesh, hen very poor.

boys pass these down among you and let you have a look at them. Here is a splendid egg producer of a remarkable capacity and thinness of pelvic bones for a Barred Rock. She is a splendid egg producer. Here is another that is strictly a meat producing type, the same breed, not a layer, putting her feed into meat very largely.

Weed out the unprofitable breeders. I would not place a bird into my breeding pen that did not measure up to the proper standard of egg production. The trap nest will tell you something more accurately, but you know that the trap nest is too expensive in time, and perhaps in money, to use generally on the farm. This system is not quite so reliable, but nearly as reliable as the trap nest.

It is called the Hogan System. You can get the book dealing with this system by writing to T. E. Quisenberry, Mountain Grove, Mo., for the book entitled, "The Call of the Hen," written by Walter Hogan. The trap nest will tell you about this, but it won't tell you anything about the male, and this system will tell you about the male as well as the female. You may trap nest layers and may get splendid results and breed them to a male of the wrong type and end the whole thing in one season. I don't allow a male in the breeding pen that does not measure up to the standard. You will not expect the male to have as wide pelvic bones or as thin pelvic bones, because he will have no occasion to spread them apart. In a hen it is like this (indicating) the ovaries spread them apart, the eggs developing in there. By using this little book you can determine the standard to apply to your males as well as females.

Q. Where do you get that book?

Prof. GILBERT. "The Call of the Hen," listed at two dollars. You get it from the American School of Poultry Husbandry, Mt. Grove, Mo., or from T. E. Quisenberry. The book was written by Walter Hogan of Petaluma, Cal.



Fig. 7. R. C. Ancona hen seen in Fig. 3. thin pelvic bones $\frac{1}{8}$ -inch. She places her feed into eggs, largely. This is a remarkably heavy layer as shown by tests in Fig. 3, 5 and 7. She proved abundantly in actual practice.

GET RID OF THE BOARDERS.

Another serious loss is keeping the old birds that never did nor never will lay enough to pay their board. There are thousands of old male birds on the farms of Illinois constantly eating up your poultry profits, and eating up what the profitable birds have produced. Old male birds should never be kept on the farm unless needed the next season for breeding. Unless they are choice birds for breeding they should not be kept. It is best to sell your old male birds even if you can get only a few cents a pound for them. If

you cannot do anything else it would be profitable to kill them, but that is not necessary, because you can get something for them. Sell them at the end of the season and before the next season begins because they are eating up the profits.

PRODUCE INFERTILE EGGS FOR THE MARKET.

Another thing in connection with these old males on the farm is that if left at large they cause the production of fertile eggs. This is worse than anything else. Fertile eggs deteriorate in a warm room or when birds are on the nest with remarkable rapidity. They even begin incubation before they get to market if they are kept in the house where the stove is hot.



Fig. 8. Hen with very thick pelvic bones—one inch. She puts her feed into flesh and lays but few eggs.

At ninety degrees they commence incubation and as a result the farmers lose hundreds of thousands of dollars annually here because dealers must allow for a certain percentage of spoiled eggs. For spoiled eggs coming in from the farmer they pay therefor smaller prices per dozen than they would pay if all of the eggs were strictly fresh. Everybody knows that and consequently we lose a great deal from fertile eggs. The law requiring strict candling of eggs makes the loss to the farmer very much greater now than ever before.

You have no business with males in your flocks except when you have some choice ones during the breeding season. They should not be with the flock. They should be with a few choice females. It is the strangest thing in the world that a great many farmers believe the male is necessary in the flock, to increase egg production. The only effect of the male bird in the flock is to produce fertile eggs which deteriorate more rapidly than infertile eggs; and perhaps this additional thing, they worry the hens so as to decrease egg production. In no wise does the increase in egg production of the flock come from the presence of the male. You want to get that idea out of your mind.

Another serious loss is the marketing of dirty eggs; we have lower prices for dirties and the difference between the price of clean and dirties is the loss to the farmers per dozen that we ought not to suffer. We ought not to have these dirty eggs. It is the consequence of poor care of nests and houses.

THE CAPON.

Now, perhaps the largest loss is in marketing the male birds. The larger loss comes from the way we market our young fries. In the early spring

when you get young fries to the market you get from twenty-five to thirty cents per pound, and later in the season when you have the main body of your flock and everybody else has theirs, there are so many birds thrown on the market that instead of getting as much as your earlier price you get ten to fifteen cents a pound instead of twenty-five to thirty-five. You have lost the difference between twenty-five or thirty-five cents a pound and ten to fifteen cents a pound. That can all be avoided by caponizing your male birds. What is a capon? Simply an unsexed male bird. The capon bears the same relation to the rooster as the steer does to the bull. Nobody would be so silly as to keep a lot of surplus bull calves uncastrated on the farm and not market them, because they would become strong and unpalatable and would have to be marketed at a greatly reduced price.

CAPONIZING.

Caponizing is the name for the removal of the sex organs from the male bird. For other farm animals we call it castration. The capon grows to be a larger bird, and you see at once he is a different looking bird and has different characteristics from the male bird. The wattles and comb are small. (Indicating with a capon.)

He takes on fat more rapidly and is more easily handled and less active and does not wear away the flesh as does the male. This bird will get more real flesh out of a bushel of food than any cockerel. The Minnesota Experimental Station has recently denied that. I think they must be wrong, although they claim they are right. I think these birds must produce a little more flesh for one hundred pounds of feed than any cock would.

MARKETING CAPONS.

What about marketing these capons? Instead of marketing them at eight or ten cents a pound which the rooster will bring, this bird will bring as high a price in the market in the season for capons as your early spring fry will ever bring. Only a couple of weeks ago I had a letter from one of the largest commission houses in Chicago urging me to send them every capon I could spare. They said, "For your small capons weighing only six pounds, we will pay twenty-five cents a pound, live weight, and for your larger ones we will pay you thirty cents a pound." That was two weeks ago. The time for marketing capons is February, March and April, just before the young fries get on the market.

What is the character of the flesh? It is tender and juicy and as desirable as a young fry, for which you get thirty or thirty-five cents a pound. This bird never gets strong or tough, he is as tender as a young fry in the springtime. He does not have the diseases that the ordinary male birds have, to the same extent. He is more healthy. They can be kept in some confined quarters without bother. They should be fed more, of course, because they fatten more rapidly, and instead of marketing them when they weigh only one or two pounds, a little fry in the summer at ten to fifteen cents a pound, you can market them, like this great, big fellow, eight or ten pounds, and have them bring the same price per pound as your earliest spring friers. He is all of the time growing and putting on flesh. Consequently in the right season you always get two or three dollars for your capons, if they are reasonably good capons.

Q. How difficult is caponizing?

Prof. GILBERT. Caponizing is so simple that any child of twelve years can do it and there is no reason in the world why you cannot caponize birds.

Q. At what age do you do it?

Prof. GILBERT. I am going to tell you about that in a minute. This capon has a brood of baby chicks in here and he clucks to them just like an old hen, and feeds them just like an old hen. You notice he never crows. Well, he has the voice of a hen. He will mother and take care of from thirty to forty chicks, better than any hen will do. Last year I placed my little chicks with a capon mother upstairs in the second story of my poultry house and he never lost a bird, although we had some extremely bad weather. Another thing, they will be fattening right along when

caring for the chicks, just as though they were not taking care of the brood.

Last year Mr. McKeene and his wife came to my house, and I went out and took one of the capons that was taking care of the brood and butchered him, and served it to the secretary of the Institute and his wife. I believe they would testify to the excellent quality of the flesh although the bird had been brooding all of the time.

I shall now caponize a bird as a demonstration. (Demonstrating caponizing.)

I want to say that the Mediterranean birds do not make good capons because they are too small, the better birds, the best birds are the Barred Rocks or the Rhode Island Reds. Barred Rocks can be dealt with earlier in the season and perhaps on the whole they make the better capons. This bird will not make a good capon because his sex organs are too far developed, as you will see by his comb and wattles. They ought to weigh from a pound to a pound and a half. Just as soon as you can tell the cockerels from the pullets you should separate them and caponize them.

In my opinion, this is the best set for caponizing. This is the set sold by George Beouy of Cedarville, Kan. Here is a simple, but ideal operating table. (Indicating the top of a barrel.)

When ready to operate on the birds, select the vigorous cockerels of the size I have mentioned. Confine them where they can not get a particle of food or any water for thirty-six hours. This empties the digestive organs so they will leave you space to see the sex organs and to work freely in their removal. The lack of water prepares your birds so they do not bleed so freely. Now, when all is ready, turn a barrel up side down out in the bright sunlight for an operating table. Fasten the feet and wings of the bird with a weighted cord and lay the bird on its side across the bottom of the barrel. Remove a few feathers from in front of the "hip" bone and with fingers locate the last pair of ribs. Thrust the sharp scalpel between these ribs as near the back bone as possible until the knife reaches the body cavity. Now, cut a slit one inch long between the ribs. Spread this open with the tool provided for it. With the little hook tear the membrane which looks like tissue paper, if it is not already ruptured. Now, next to the backbone, push aside the intestines and observe the little yellow testicle like a grain of wheat. Using the tool provided for this purpose, slip it over the tube connecting it with the body. Allow the opening to close and turn the bird over and operate on the other side for the other testicle in the same manner. It is not necessary to put any antiseptic upon the wound, yet I always touch the wound up with a cotton swab wet with iodine. I believe this to be a good thing to do. Now, turn your bird loose away from the general flock, because these little fellows are somewhat weakened



Fig. 9. Barred Rock capon—eleven pounds. Worth more than \$3 on the market.

and the flock might trample upon them. Feed the birds and water them after the operation, giving some rather easily digestible food. Within a few days the birds are ready to go back into the flock. A few days after the operation, you may find the skin puffing out from the body of some of the birds. The skin healed before the flesh did, and the bird sends air through this opening when it breathes. This is no cause for alarm. Simply catch the bird and with a sharp knife cut a fair sized hole in the skin and press the air out and the skin down.

DRESSING CAPONS FOR MARKET.

If you kill capons for the market, leave the head with feathers on the upper part of the neck. Leave also some of the tall feathers and a few of the feathers on the legs just above the shanks. This is the means of identifying your bird as a capon and giving you the higher prices. Capons are generally drawn also, I believe. Of course, to get these high prices for capons you must have enough birds to fill a coop or a section of a coop, for if the dealer sends in only one or two capons with a lot of other birds, the capon is apt to bring only what the others bring. Dealers cannot be expected to handle one or two such birds. They must have enough at a time to pay them for marketing them separately. A dozen or more at a time would make a nice shipment that commission men would be glad to get.

Q. Were those prices you gave a while ago for dressed birds?

Prof. GILBERT. No, sir; those were for live birds, they were up to forty cents a few days ago, dressed.

Q. What market do you ship to?

Prof. GILBERT. Chicago is an excellent market. We ship to Chicago market instead of St. Louis, although we are nearer St. Louis. The Chicago market seems to be a little better.

Q. Do you always take these organs from both sides?

Prof. GILBERT. Yes, it is best; you can get them from one side, but here is the trouble. The membrane that holds up the digestive organs is between you and the testicle on the other side and it is better to make the slit and take it out from the other side.

Q. Did you ever lose a bird from bleeding?

Prof. GILBERT. Yes, there is a big artery in there, and with some caponizing instruments you rupture them and he may bleed as though you cut his head off.

Q. What if he does that?

Prof. GILBERT. Then just eat him for there is nothing else to do. He is just as good as if killed in the usual way.

Q. Do you have any "slips"?

Prof. GILBERT. Very few when I use this set of tools.

Q. What do you get for them?

Prof. GILBERT. Oh, they bring nearly the same as your hens. They are bothersome scoundrels and are hard to handle.

Q. Will the local buyer pay as much for the "slips" in large bunches as capons?

Prof. GILBERT. Well, that may be true. If you have many "slips" you will get a weakened market on it. The slip is this, where you mangle the sex organs so as to leave a part of them in, and the bird repairs that damage by rebuilding it. Now, that disordered sex organ makes the bird partake of the characteristics of the cock bird and of the hen. He is "betwixt and between" and he is not a real capon nor a cock.

I have caponized before about seventy-five audiences, and I have been lucky enough to not kill one before an audience. In all my caponizing I have killed only two birds. The number you kill is negligible.

My time is up, but there are many things that we might discuss, such as sanitation, proper housing, the proper type to use, the balanced ration, and the effort in winter time to get conditions as much like those in spring as you can. Green feed is very necessary; sprouted oats is the best, but troublesome perhaps for the farmer to get. The next best thing is mangel-wurtzels or giant stock beets. Grow them as you would early garden beets.

You can grow sixty to eighty tons per acre. These beets, put into the ground, and hilled up with dirt late in the fall, or placed in the cellar, will furnish you one of the very best green feeds known.

Drive up spike nails in the poultry house, placing them as high as the birds can reach. Stick these large beets upon the spikes in the winter and your fowls will eat them and be more healthy and the egg production will greatly increase.

Select a heavy producing strain of birds, use good business methods, and with a properly balanced ration, proper sanitary housing, and proper care, poultry will pay you highly satisfactory profits on the farm. [Applause.]

THE PENDING TAX AMENDMENT.

(*Mr. Geo. C. Gale.*)

GENTLEMEN: It is pretty tough to ask a fellow to come here and talk about a pending amendment to the Constitution after just such a talk as you have heard. I wish I could give you as good a talk on this subject and dissect it as carefully for you as Prof. Gilbert has just handled his subject, but I cannot do it, I haven't the time. I like, when I am attempting to make a speech anywhere, to make the speech without having a lot of papers in front of me, but a speech of this kind depends for its value on the figures given. I don't want to trust my memory on these figures, and I want you to be sure that when I quote you any figures here I am quoting them accurately, for they have been made up with considerable care and many checkings over to make sure they are right. I feel very certain all of the figures I shall give you to-day are absolutely correct.

Now, you may think this tax amendment proposition is a queer thing to ask you to devote your time to, but it seems to me that it is one of the most important things that we farmers of Illinois have ever had put up to us for consideration. I think it is more important than the foot and mouth disease, and I am one of the unfortunate individuals who has reason to think that the foot and mouth disease is mighty important, too.

DISCOURAGES OWNERSHIP OF LAND.

I believe the future success and prosperity of the Illinois farmer depends fundamentally on a system of taxation which will encourage individual land owning on the part of the greatest number of those who have chosen farming for their life-calling.

The present system of taxation in Illinois discourages ownership of land and it will require an amendment to our State Constitution to change it. After all of these years the Legislature finally got two-thirds of its membership who were not afraid of us. That is the only way to put it, who were not afraid of us. You go down to the Legislature and listen to them talk and you will think the dear public is a ravenous pack of wolves ready to leap on and devour anything they get hold of, especially our farmers, that they want to go in and destroy everything.

You had a Revenue Commission appointed here by Governor Oglesby away back in 1886. I remember the work of that commission because my grandfather was one of the members of it and the man who did most of the work on the report. It reported a system of taxation that would have put this State ahead, financially speaking, fifty years of what it is to-day. Could you get a hearing for it? Why, not by any means, and we go along with our present archaic tax system that is one hundred years old, and we go along for nearly twenty years before you get another tax commission appointed, composed of John P. Wilson, one of the greatest lawyers of the State; Harrison B. Riley, president of the Chicago Title & Trust Company; Justice Craig, who was on the Supreme bench for twenty years; A. P. Grout, many of you know him; Ben F. Caldwell; President James of the State University; and B. F. Winshell, vice president of the Rock Island Railroad; and they report that an amendment to the Constitution is required before any reform in taxation can come in this State. You have to go through three Legislatures before you can find one that is willing to trust the public to vote on it.

I think sometimes that we farmers ought to be a little more careful about the fellows we send to the Legislature; if we spent as much time on them as we do on raising live stock we probably would get a fair show. [Applause.]

NOT SINGLE TAXERS.

Now, another thing that wants to be disassociated from our minds before we come into any discussion of this subject at all, and that is the idea that the people who want this amendment are single taxers. We farmers have a prejudice against the single tax fellow because we think it would compel the farmer to pay all of the cost of government, but, don't you know that under our present system they come pretty near giving us all of the disadvantages of the single tax with none of the advantages that are claimed for a real system? They make us pay seventy per cent of all the taxes raised in the State, seventy per cent comes out of the real estate to-day and ten per cent out of the railroads—8.46 per cent to be exact—and the balance of it out of personal property of one kind or another.

It is not a single tax system that the proposed amendment to the Constitution will bring about, not by any means. If you don't believe it, read the single tax paper called "The Public" that is gotten out in Chicago and see how they fight it, they jump on everybody who advocates it as a remedy for our evils.

You are very apt to find in your community many people who are opposed to the attempt because they think it is an attempt to foist single tax on the farmers of Illinois. I am not here to advance single tax system, I just want to get it on your minds that this is not a single tax theory at all, and it is not an attempt to foist the single tax system on you, but it is an attempt to do away with some of the inequalities and some of the injustices that our present system has.

Mr. MANN. A proposition to avoid single tax?

Mr. GALE. A proposition to avoid single tax. I thank you, Mr. Mann.

We must understand that this proposition is the most important thing we have to consider Government taxation. Taxation is the foundation of government. Do you know practically all of the liberty of the world that our ancestors got through years and blood has been wrested from the ruling classes through taxation? It was the demand of the Commons of England to share in taxation which brought about the beginning of liberty for us, who are governed by the common law; it was the demand and insistence of the people of France to have the right to say something about taxation which brought about the French Revolution, which, through its deluge of blood finally resulted in as much liberty as the World outside of the common law has got to-day. It was a question of taxation which caused our own revolution. It is the most important subject touching on the affairs of every one of us that we have to consider. It is worthy of our careful attention.

PRESENT SYSTEM VERY OLD.

The present system which we have in Illinois is nearly one hundred years old. Section 20 of article 8 of the Constitution of 1818 and section 2 of article 9 of the Constitution of 1848 and section 1 of article 9 of the present Constitution of 1870 all provide that the General Assembly shall provide such revenue as may be needful by levying a tax by valuation so that every person and corporation shall pay a tax in proportion to the value of his, her or its property. It is known as the "uniformity" clause. Now, while that provision is in our Constitution, all of the property in Illinois, real or personal, tangible or intangible, whatever it may be, has got to be assessed alike, except some few things which it is provided in the Constitution may be separated, licenses and that sort of thing, for instance.

Now, you are here met with a very great distinction. There has grown up in the last—well, it is pretty nearly a growth of the last twenty-five years, certainly it is a growth of the last fifty years—an enormous quantity of intangible property, that is, property represented by credits of one kind and another. The credit which you use by means of checks, the property represented by mortgages and the property represented by bonds, that is all

intangible property. Nobody knows how much there is in Illinois to-day. The assessed valuations don't show the credits, but we do know that there is an enormous amount of that kind of property. Now, you cannot tax that property on the same principal that you tax land. What is the reason? It is provided that taxes shall be uniform. We have provisions for local assessors all through the State of Illinois. I don't know what the assessor does in your town, but in my town where I live the assessor comes out to the farm and looks over the stuff, and he does this with everybody else, all of us in the town, and he says, "Now, what is this land worth?" Well, we will call this land worth \$100 an acre or \$150 an acre or \$300 an acre, but, since there is a variety of opinions, I am going to be sure that I don't assess it too much. The result is the average assessment in the town in which I live is \$80.31 per acre; that is not one-third, that is the full value. That township, of course, has thirty-six square miles in it, out of that comes the city of Galesburg, which has nine miles; there are twenty-seven miles left. I suppose the average value of land in that township is not less than \$275 an acre and the assessed valuation is \$80.31. In Knox County it is \$51 per acre. That is not one-third, that is the full value. So too, the assessor looks at the live stock and implements. Honest men differ as to their judgment of such values. It is not fair for the assessors to assess those values at the highest opinion and he does at the lowest opinion. But when you come to intangible property, you cannot differ as to the value. Here is a mortgage of \$5,000 on a quarter section of land worth \$30,000. What is it worth? It is not worth forty-five hundred or fifty-five hundred or forty-nine hundred or three thousand dollars; it is worth five thousand dollars. It has got to go in at \$5,000 and it goes in at \$5,000 if it goes in at all. When intangible property is assessed at all, it is assessed at one hundred cents on the dollar. It is the only property that is, and the result is so grossly outrageous, so grossly unfair you simply cannot assess it. The present tax laws of Illinois make the State a school for perjury, with the State the teacher and the tax payer the pupil, and heavy penalties if the lesson be imperfectly learned. [Applause.]

THAT UNIFORM CLAUSE.

It is physically impossible to tax intangibles under such a system, and so well do we learn to be perjurers and so sympathetic are we with perjury because we realize it is the necessity of life under our present system, that I would like to have you look at these figures. In 1873 the total value—the total assessment rather—of intangible property in the State of Illinois, that is the full value, not the assessed value, was \$347,462,465; the total assessed value of intangibles in Cook County was \$29,166,520. In 1915, the total assessed value of intangible property in Cook County, figuring on the same basis was \$37,250,817. In other words, the intangible property in Cook County, which, between 1873 and 1915 has gained by thousands of per cent and perhaps is a thousand times as great, shows an increase on the assessors' books of eight million dollars or twenty-seven per cent, and the total assessed value in tangible property in Illinois was \$265,990,388. In other words, so far as the assessor's books go, we have decreased in Illinois nearly twenty-five per cent from 1873 to 1915. How is that for a uniform clause in the Constitution getting results so far as assessments go? It does not get them.

Now, I hope you all have this little booklet called "Apace with Progress," and if you have you will find the same figures I have given here are taken from page 8; you will note on page 8, table 3, showing the valuation of intangibles is what I have given for the year 1915.

A SCHOOL FOR PERJURY.

We have a beautiful system here in Illinois; the total "fair cash value" of personal property assessed in 1915 in Illinois was \$1,523,461,047, and out of that there was listed under the heading "all other property," \$399,768,396, practically four hundred millions, more than twenty-five per cent, and the assessors did not know how to list that. If you take twenty per cent of that

amount, figuring twenty per cent of it represents intangibles, and add it to the figures I have given, you will get the figures in the booklet even if you add that twenty per cent of that four hundred million dollars to the assessed valuation of intangibles in Illinois, two hundred and sixty-five odd million dollars, you get \$345,944,017 for the State of Illinois in intangibles in 1915, when your total figures for 1873 without figuring twenty per cent of all other property, were \$347,700. You are still losing. Cook County shows a little increase when you figure it that same way. There is not a man here but knows that sort of assessment is unfair, and as I said, it is a school for perjury. It not only makes the State a school for perjury, but it creates contempt for all law, and that, as you well know, is one of the dangers of American civilization. That is one of the reasons why we should get rid of these taxing laws that we have in Illinois to-day. As an illustration of the folly of taxing intangibles as we try to do here, we may note New York, where, by our way of taxing, they formerly got \$935,000 a year out of their taxes on mortgages with a \$3 rate. Then they concluded that there was a better way, and they levied a tax of one-half of one per cent on a mortgage when a mortgage was filed, no matter how long it had to run, and they get annually three and one-half million dollars out of that tax, because that is a fair and reasonable tax, and can be enforced. In Minnesota if your mortgage runs for three years the tax is fifteen cents on one hundred dollars, payable when the mortgage is recorded and twenty-five cents if it is for more than three years. Yet, out of that small fee, which is reasonable and which people are willing to pay they get a very fair return, the same as New York does. You can tax intangible property if you put on a fair rate of taxation, but you cannot tax it if you confiscate the property. There never was a tax system in the world in which confiscation was imposed and enforced without causing a revolution.

Q. Under the Minnesota or New York law the borrower pays the taxes?

Mr. GALE. I presume under the Minnesota or New York law the borrower pays the taxes. What is the result? Here in Illinois the borrower pays the taxes, the State don't get any benefit out of it, your mortgagee who loans you his money realizes that, if he is honest or if he is going to make an honest return, practically throughout Illinois he is going to have to pay two per cent in taxes. If we had a fair law, such as New York has, for instance, don't you believe that while we might have to pay taxes which would be the equivalent of one-half per cent, we would get our money cheaper? Don't you believe the mortgagee takes into consideration in loaning money that he may be caught, and he charges us a little more money for it? It is a certainty that that is taken into consideration.

Now, under our system, you get double taxation. Here is a man who owns a quarter section of land, worth, we will say, \$20,000, free and unencumbered, and he pays tax on the \$20,000; a neighbor owns another quarter next to him and moves away; and he buys from this neighbor for \$20,000 and gives a mortgage on the two quarters for the purchase price. The first man pays on \$40,000 and the second man, if he is honest, on his twenty thousand, although no property has been created anywhere. As a matter of fact the second man probably don't pay on it, but he would charge the other man a higher per cent for the risk of having to pay. Thus the purchaser has to pay his extra per cent, an extra tax, and none of it goes to the Government. Double taxation is bad enough; if it were double taxation that brought money into the treasury there might be some excuse for it, but it is double taxation that does not do the public any good. That is one of the things that has to be cleared away. What is the result of all this system, so far as the farmer is concerned? Here is what happens. The real property in 1873 paid 67.69 per cent of all the taxes paid in Illinois.

Q. Is that farm land or total real estate?

Mr. GALE. Total real estate; I cannot find anywhere in going over the figures a separation of farm lands from the total real estate. It is a

job I suppose could be done by taking time enough, but I could not give the time to do it.

Q. Have you any idea what the proportion would be between the town lots and the city lots and the farms, a half or a third?

Mr. GALE. I have an idea, but it is just a guess, and I would not want to say because I have not verified my figures enough to know, to try to give you a figure on that.

Q. Didn't the State Highway Commission use those figures?

Mr. GALE. I never saw any figures from the State Highway Commission.

Q. They tell the farmer he is getting the best end of it?

Mr. GALE. As I said before, they tell you we are getting the best end of it, but you try to get anything done and they tell you we are a pack of ravenous wolves, and want to eat everybody up. [Applause.]

Q. In making out a tax schedule when the assessor comes around don't you have to swear to it?

Mr. GALE. Sure.

Q. Isn't it perjury if a man does not give it honestly?

Mr. GALE. Yes.

Q. The assessor doesn't come around to the man in the city?

Mr. GALE. No; the assessor does not come around to the man in the city. A great many of the men in the city who ought to be paying taxes are never reached at all.

Q. Never asked?

Mr. GALE. No, sir.

Q. Do you know of anybody being punished in a case of this kind?

Mr. GALE. No, and I doubt if one ever will be.

Q. Isn't it a fact that the mortgages of the eastern companies provide that in case they are taxed on their mortgages they can demand or force the borrower to pay the companies?

Mr. GALE. I don't know.

Q. Well, is it not a fact that all of the mortgages of the eastern companies make or are provided with a clause that the farmer borrower if he refuses to pay the taxes they can demand it, and demand foreclosure if he does not pay?

Mr. GALE. I did not know that. I should think it would be likely that they would make such a provision.

By 1915 the percentage had risen a little. Real estate paid last year, or will pay, when taxes are collected this year for last year, 70.16 per cent of all the taxes collected in the State; the railroads paid 8.34, capital stock of other corporations 1.10; personal property of all kinds, 20.04.

Now, under a system very similar to ours New York State operated for a great many years; the development of New York as in all of the eastern states was, of course, some years ahead of us here in Illinois. By 1880 the real property in New York was paying 87 per cent of all the taxes paid in the state. It simply left for the railroads and for capital stock of various kinds, one kind and another, a few per cent, and then a few per cent for personal property, practically nothing at all in fact. They changed their system in New York then so that the real estate did not have to bear all of the burden. The result is in New York real estate to-day pays only sixty-five per cent of the total taxes.

I take it in a State like Illinois, the real estate owner must always expect to pay more than half, possibly more than sixty per cent of the taxes paid, but he certainly ought not to pay a great deal more than sixty per cent. Personal property ought to pay something, intangible property ought to pay something. There ought to be a fair system of taxation so that intangible property can be made to pay its fair share, because after all, when you finally get down to the results, intangible property needs the protection of the Government more than any other kind of property. Intangible property should pay a fair return, but it cannot pay it while you have the present laws.

Some people say, "Why not get your result by causing an honest enforcement of the present law?" Well, I think the honest enforcement of the present law would drive every owner of intangible property out of the State. I believe no man will pay that; just think if you honestly enforce the law and take a tax rate of two per cent (that might be a little high, but I think it is not, you people in Decatur know what it is.)

A VOICE. Two per cent.

Mr. GALE. It is pretty near two per cent all over the State, at least in the cities; it is a little less in the outside communities. Supposing you had savings bank deposit and were getting three per cent and had to pay two per cent in taxes, and supposing your bonds had four or five per cent income and you had to pay two per cent in taxes, and it had to be always collected, and the result would be as I said before, it would simply result in confiscation and the people would say, "Well, Illinois might be a very nice State to live in, but it is not worth the price," and they would not pay it.

Q. What would be the percentage of taxation on a five per cent income?

Mr. GALE. Forty per cent of your total income. We think the present income tax is high enough and we think the English income tax is outrageous, but an income tax of forty per cent of thirty-three and one-third per cent, if you are living on an average of six per cent, is pretty high.

Q. The farmer lives on labor and not income.

Mr. GALE. On what the taxes leave him. Most of the progressive farmers and most of the progressive business men in the United States and all over the world are men who borrow money and they have got to figure as one of the biggest elements of their expense the rate of interest they have to pay. The present tax system of Illinois tends to make the interest greater because every lender is looking out for fear that he is going to have to pay that outrageous tax on intangible property which may be assessed against him.

The thing to do, as it seems to most of the men I know, who have thought about this subject, is to pass this tax amendment.

NOT A "CURE-ALL."

Now, that tax amendment is no "cure-all." The tax amendment to the Constitution will not cure all of the defects we have, by any means. It won't do one thing for us unless we get the Legislature to pass a decent law. All the tax amendment will do, if passed, will be to put the Constitution in such shape that the Legislature, if it wants to do it, can make a reasonable tax law for the State of Illinois. And if it don't want to, it don't have to. Even if you elect a good Legislature that wants to do what is right, it cannot be done under present conditions. I have a reverence for the people who made our laws and Constitutions, but I don't believe the men of 1818 could foresee conditions of to-day. I don't believe there was a man who helped to adopt the Constitution of 1818 who ever dreamed of a city of three million people on the banks of Lake Michigan. I don't believe they ever dreamed of the problems of education and sanitation and penal reforms, which to-day are taking so much of the money of the public, in quantities that were unheard of only a few years ago. Furthermore, property was then tangible in character, there was but very little intangible property. Why, it is estimated by people that ought to know something about it—I am not sure they do, but they ought to know something about it—that the National debt at the time of the Revolution was one-quarter of the total property of the United States. If those figures are anywhere near true, it must be that there was almost no property then except land, and the animals and instruments required to work on the land. In 1818, in this State, that was undoubtedly true. There were few bonds, if any. Of course, in 1818 there was no corporation in the State of Illinois, bank deposits amounted to very little and there were no stocks or bank property as there are now.

Under present conditions we who own land in Illinois, and the majority of us sitting here in this meeting to-day are landowners, are going to pay taxes which will increase proportionately from year to year until it amounts to one hundred per cent.

Personally, I believe in all of the things that make the farm attractive; I believe the best State and the best Illinois would be the Illinois which had the most people residents on the farm, but to-day if you are to make the farm attractive you have got to make it prosperous. Your boys when they grow up and your girls when they grow up are not going into a business that they think is a dead one. They are going into some business where they can see a future prosperity.

The real reason for the anxiety on the part of the farmers about the tax system is because of the way it affects that very thing. Won't our farms be more prosperous and won't our chances to handle them be better if we have a decent tax system? When you have a law which can not be enforced you thereby create a disrespect for all law, and the great disadvantage of the United States to-day is disrespect for the law. You have got a tax system which makes for it. You have got a tax system which creates perjury, results in double taxation and throws the burden on land with no resulting compensation. This fall you will have the chance to do away with it. Vote for the amendment and make it possible for the Legislature to pass and our officials to enforce an honest and just tax system.

I thank you for your attention. [Applause.]

WEDNESDAY AFTERNOON SESSION.

First Methodist Church, 1.30 o'Clock.

HON. D. M. MARLIN, Norris City, Presiding.

CHAIRMAN MARLIN. Several changes have been made in the program. Instead of the Millikin Male Quartette, we will have a solo by Miss Green of Millikin University.

Solo, (Selection)Miss Green

CHAIRMAN MARLIN. The next number will be very interesting and delivered by a very interesting gentleman—"Landlord and Tenant," by the Hon. Charles Adkins, president of the Live Stock Breeders' Association of Illinois. [Applause.]

LANDLORD AND TENANT.

(Hon. Charles Adkins.)

MR. CHAIRMAN, LADIES AND GENTLEMEN: I remember one time at an entertainment in the penitentiary at Joliet, one of the convicts was the presiding officer. He got up and addressed his audience saying: "Fellow inmates." He hesitated a moment. He didn't think that sounded very good and then he said: "Fellow convicts." He changed it again and said: "I am glad to see so many of you here." [Laughter.] I am just going to say "Fellow farmers" and I am glad to see so many of you here. I don't know whether I will be able to speak so you will understand me or not as I have a bad cold and perhaps that will be a good excuse for relieving you a little bit sooner.

A MATTER OF FIRST CONSIDERATION.

The question of "Landlord and Tenant" is one of the important topics in America. We have about six million farms. We have about one and a half million of them operated by tenant farmers. When we think of all the money and all the thought that is being expended to maintain the fertility of these farms in order that we may feed the present generation and leave them so that future generations will not perish from the face of the earth, we say that our present system of landlord and tenant is a matter of first consideration.

First of all, we have several different kinds of landlords as well as a good many different kinds of tenants. We have in the first instance the speculator, the man who speculates in real estate, and we will never get our agricultural interests in this State on a permanent soil conserving basis

until we have passed out of that speculative stage and until we have the price of land down to its producing value.

GOOD FIELD FOR SPECULATOR.

During the last thirty years the good farm lands in Central Illinois have quadrupled in value. Thirty years ago you could buy good prairie land for \$50 an acre, but to-day it is worth \$200. It has been a good field for the speculator. He buys the farm, not that he may make dollars and cents out of the advance in that line and while he is holding it and waiting for the advance, but he usually rents it for the year to the best soil miner that he can get hold of and to the man that will pay the highest rent, and he is usually the man that can mine the most out of the soil. That class of tenants has been one of the largest factors in depleting the fertility of the fields and putting nothing back on them. When the time arrives that the speculative feature is gone in this country, it will eliminate that sort of a landlord and that sort of a tenant.

We have another class of fellows who own land and rent land. The speculator is the landlord. We have another class of citizens that are landlords who have been soil depleters in this State and you can look it over in your own county and you will find that to be true. By reason of the continued advance in lands in this State, men engaged in other lines of business than agriculture have found a very good place for investment in the farm lands of the State. You will find men engaged in the banking business, also lawyers, doctors and manufacturers with a surplus amount of money which they don't want on their hands but desire to invest it in something. First, it has been a safe investment and then it has been an investment that has grown rapidly and they have gone into the country. They are not naturally farmers and they hunt up a tenant that will pay the largest rent and with no assurance of more than one year at a time he proceeds to get all out of it he can.

The investor gets a large return in addition to the increase in the value of his lands and the tenant will only be there one year, so he gets all he can. That is also another class of landlord that has been depleting the soil in Illinois.

TIME WILL ELIMINATE SOME.

We have another class of fellows who are equally hard on the soil and who make no effort to better its physical condition, or the conditions in the community, and he is the man who owns the small farm and expects that farm to make a living for him and for the tenant as well. He is hard on the soil and he is hard on the community, because it takes all that he can get out of it to maintain him and takes all the tenant can get out of it to keep him in shape to support himself.

We have three classes of fellows that time will eliminate who are renting land in this State and other states and who have been the greatest factors in depleting the soil and who to-day (not one in ten of these three classes of landlords) are heeding any of the admonitions that are given to them, at meetings of this kind, to get them to adopt a permanent system of soil improvement. We have a few landlords who do have a natural love for the soil. Some of them got their farms from their ancestors and they have lived there and loved the old place and have gotten to the point in life where they are incapacitated, by reason of age, and in some instances disability, and they want to retire, and yet they don't want to see that farm go down. Do they go out and hunt the man who will "corn" and "oats" the land and nothing else, and go in there and mine the farm? No! We find that class of landlords in Illinois and in other states where I have happened to be; they go to some fellow who is interested in the community as a citizen, and who is a good farmer, and who is honest, and they say, now let us enter into an arrangement that is equitable to you, to myself and to the farm. There are three factors. The farm represents the interests of posterity and we must live so that future generations will not perish from the face of the earth. He will say: "You must have enough

for yourself and family and I must have enough for my investment." Those are the only people who are doing anything for the conservation of the soils in the corn belt. We find the system practiced by these three kinds of landlords to be depleting the soils in this country.

THE DIFFERENCE BETWEEN \$75 AND \$250.

Show me a farm run like that for thirty or forty years and I will show you a farm in the richest section of the corn belt that will not sell for any hundred dollars an acre. I have a case in mind where the farm had been rented and farmed in corn and oats where the landlord wanted all he could get from it and it was run for perhaps fifty years and everything taken out—400 acres of land in one of the good counties in Illinois. It finally had fallen into the hands of the heirs; they lived back east and they wanted the most rent they could get from a tenant, but the farm was no longer a paying proposition. The soil was depleted and one man in the neighborhood who owned 200 acres of land that had been well maintained sold it for \$250 an acre and bought this farm for \$75 an acre. One was run under a good system and the other under the plan that I have just mentioned. That is the finish of all of these kinds of farming. Then you say, "What are we going to do?" "What sort of a practical proposition is there in operation or can be put in operation that will remedy this?" You take the man who leaves his farm and loves it, and, as I said before, he gets the fellow that is a good farmer and has good judgment and is an honest and trustworthy man and he is taken in as a partner.

TENANT ON SAME FARM TWENTY-THREE YEARS.

Some people say this cannot be worked out, but I know it can as I have been trying it out for twenty-three years. I know it is a practical proposition. He will say that if we are to prosper we have got to work together for a long number of years, now let us see if we cannot find some equitable basis on which to operate. He will say: "I want you to be interested in the community and bear a part of the burden in the matter of maintaining this community. I own land and I am going to keep that farm up, and tile it where it needs it and will keep the fences up in good shape and the house and barn painted, and I will keep it looking just like it looked while I lived there. I am going away and I will sell you a half interest in all the tools, horses, cattle and pigs there are on the farm and I will take an inventory of this stuff the first of March, and I will charge this up to the farm and I want you to go along and furnish all the labor necessary to run this farm. I want you to pay one-half of the taxes on this farm and I expect you to take my place in the community. I have prided myself in being a factor in building up a good community. I want you to see if the schoolhouse burns down that another one is built and want you to help pay for it. I want you to adopt the system of rotation that will maintain this farm so that if you live here twenty-five years and then go away, it will be just as good as when you took hold of it. We will go along and raise our crops and we raise our stock, and when we sell anything divide the money. You send me a check for half. Don't put it in your pocket as it will get mixed up and you cannot tell mine from your own at the end of the year. If you sell a carload of cattle for \$1,400 get me a check for \$700. We will settle after every transaction and you and I will be long friends."

LONG TIME LEASE BEST FOR COMMUNITY.

I never knew a man who started out on a system of that kind where both men were honest and when each man recognized the rights of the other but that they went on indefinitely on that sort of a proposition. Where that proposition is worked out you will find the best maintained farm in the community. I know one man that went on for seventeen years on that sort of a plan. I have lived on a farm of 560 acres for 23 years and never had a contract. Twenty-three years ago we started.

I prefer the plan I outlined for this reason: it makes the man more interested and a greater factor in the affairs of the community if he is helping to pay the bills.

We got started in on a little different line. The landlord pays the land tax and I furnished all the work-stock and machinery except water tanks and things of that sort and we each pay one-half the taxes on the personal property while he pays all the taxes on the real estate. There would be very little difference if he owned half the chattel property and I paid one-half the taxes on the land. If I were starting in new and in cases where I have recommended a system to other men, I would always recommend having each man bear one-half of the burdens of the community because your tenant takes your place. He will take a greater interest in the community if he is paying part of the taxes. He will use his influence to have good improvements put there. There is very little difference in the two propositions.

SHOULD SHARE LOSSES WITH TENANT.

Another thing you will find if you adopt a system of that sort, you are not asking the tenant to do all the improving for you and do all the soil building, because you know he would not do it. If you expect him to leave forty acres of clover and take all the risk, he is going to find some excuse to plow that up in the spring. There is some of the time he don't make any money out of the clover crop but it is helping the land and building up a better situation for you next year. He is a poor man and if he loses, it is a little hard on him. If there is a loss in handling that and you share the loss, and if you settle with him after every transaction and at the end of the year take an inventory, and if there is a calf gone and not accounted for in the sales account, ask about it. You don't need to go to the farm as you can keep an absolute check on what is going on. If your tenant is a fair minded man and the landlord is, you can go on indefinitely and there is no reason for any trouble.

We sell on my place about \$12,000 worth of stuff a year off this 560 acres of land and it all passes through my hands. We made a contract that in the event that one thought the market was good at one time and wanted to sell and the other had faith in the market and wanted to hold, the fellow that wanted to hold bought the other fellow out. That situation with me has never arisen. Say we have a bunch of corn to sell and we talk it over. One will say, "What do you think about the situation?" Each fellow gives his views and we arrive at a conclusion as to what is best to be done. We had a carload of hogs three weeks ago and he came down and said: "Don't you think we should sell those hogs?" I said we might have eight-dollar hogs. He thought we would have 75-cent corn in a few days. I said, "All right, we will hold the corn and sell the hogs." This time the hogs went up but perhaps the next time it will go the other way, so that in a period of ten years of your compromises, one about offsets the other. In twenty-three years business in handling ten and twelve thousand dollars a year partnership money we have never had an occasion to disagree to such an extent that one would buy out the other. If the fellow that wanted to sell would present the reasons that would convince the other fellow, we would make a sale and if we decided to hold we would hold. There is no need for any proposition to come up over which there would be such a violent difference that two men could not compromise.

In my case and my brother's case, who has the same kind of a plan, we are a part of the community and take a part in public affairs that come along and our influence is felt the same as our neighbor's and we feel we have the same interest as the other fellow, but in twenty-three years the crowd of fellows that I go around with threshing, of that crowd there is but one man living there out of thirteen that were there twenty-three years ago. They have changed and there are other people in there now. Those farms are gradually growing poorer and poorer. If the fields of Illinois that are depleted to-day are to be rejuvenated, and those in a fair state of cultivation are maintained by the men who don't live on their farms, it has got to be done through a system of cooperation between the landlord and tenant

and it must be equitable to the tenant and the farmer and the farm. There is no other plan under which it can be done.

You can talk about the various things to be done on the farms and you can talk about the boy going back to the farm, but you must adopt some permanent plan of agriculture in this country before these other methods can be worked out. The great detriment to the agricultural interests of this country is the lack of permanency. The farms that have been farmed for centuries in the old world that have been maintained, and a very large part of them are occupied by tenants, have been followed by father and son for three hundred years and more.

We will have to have some changes in our laws in this country before this can be worked out. The average tenant does as little as he can that will be of benefit to the soil for the next year. He will say: I don't know whether this fellow is going to raise the rent on me if I increase my production and I may not be here to get the benefit of that." I know that occurs in every neighborhood. That is not true in the old world. Long years ago they made laws to protect the soil. We find that the tenant who sells grain from the soil has to put the fertilizing value of that grain back on the farm. Under the law, if he puts more fertilizer on the land than he has time to farm out and his landlord makes him move, he comes back under the law and is permitted to collect from the landlord the value of that extra valuable fertilizer that he has not taken out of the soil. You will find that the people are very careful about doing anything that will be of material benefit to those farms the next year because he will not be there to farm it himself and he will not get any return from it. The men who are interested in conserving the fields have got to take up this matter and work it out. We have gotten to the point in Illinois where we have to look to that feature. Here is this great audience here to-day. Now, what does it mean? Why are we here? To talk about these hard problems and there never was a time when it was of more importance than to-day, and there never was a time in the history of the country that there was as great responsibilities resting on you men whose duty it is to feed the nation, as there is to-day. There never was a time when it was more necessary that you adopt a plan, not only of landlord and tenant, but a system that is practical and equitable to all concerned to be worked out so that you can continue to feed the races and continue, with your posterity, to do the same thing.

PLAN WORKED IN IRELAND.

These conditions don't work out themselves. There are certain things that must be done to work out the desired results. Take the tenant proposition, and you will find it on the increase in this country. Statistics prove that the ratio is increasing all the time. It means one of two things, that in time—not perhaps in your or my time, but we will develop into a sort of system like they did in Ireland. You all know what happened there. It went on until all the land in Ireland was rented. It went on until the Irish farmer was the poorest man in the world. It went on until a revolution took place and a movement for the government to buy the land and sell it back to the Irish farmer on sixty years' time, was promoted. The Irish farmer bought the land that he had once been renting and he found that his annual payments were less than half of the rent and in sixty years he would own it. Some of the farms are being paid for in twenty-five years. I was talking to a young Irishman who was a trader and he said, "If I wanted to be a farmer I would have stayed in Ireland as I could have owned a farm and paid for it"—meaning that he could not do that in this country under the landlord and tenant system now in vogue.

PENDULUM WILL SWING BACK.

However, I am not looking forward to any such sort of a land revolution in this country as there are other agencies and changes that are working to equalize that proposition and in time a larger percentage of our farmers will be landlords and the pendulum will go back the other way. Why? In

the development of agricultural America the first thing we had to do was to make the conditions such that men with large means would take hold of our transportation problem and put their money into railroads. We offered special privileges to get them to put their money into transportation lines in this country. You all know what happened. We gave to the railroad companies of the country a bonus of land in area as large as Wisconsin, Michigan, Indiana, Illinois and Ohio combined. They, in turn, offered with that land special inducements for settlers to make more business for the railroads. It went along for a long time. The same thing was true with large corporations that developed all our various enterprises. Then the pendulum began to swing back the other way and it was found that they had abused their privileges and a demand came for regulation and the insistent demand went on almost to the point of destruction. The time was when you could count the number of people who owned the railroads in very small numbers, but to-day, more than seven hundred thousand people in the United States own the railroad companies.

Instead of the banker and professional man and every other class of citizen who has surplus cash, as in the past, it would seem from the tendencies of the times that proper regulation of the railroads is coming when they bring about laws making those who are responsible for financing our railroads responsible to the people, so that the people will have the same confidence in a railroad president that they have in the bank president and will invest this money which is seeking a safe and remunerative investment. The same with lands. They have invested this money in lands for the purpose of receiving a return on their money and an increase in the value of the land. When that proposition comes around and a condition is made that will inspire confidence in the people who manage the finances of the railroads, so that such stunts as were pulled off in the New Haven deal shall be unknown, and see to it that men who perform such feats of high finance are sent to the penitentiaries, you will find that this money which has gone out in competition, seeking investment in railroad corporations of that sort, will be invested in lands. You will find a little later on that men who own lands are men who will have a love for the soil. You will find that transportation lines will not throw up their hands because they will have more money than they know what to do with.

A man would rather invest his money in four per cent railroad bonds than farm lands. Take the farms in Illinois as they run and an investment in them barely pays three per cent net on the investment to-day. I defy any man to bring figures to the contrary. I think that feature of the proposition will adjust itself and when we come to talk these matters over they are not so hard to solve. A little gray matter and attention to the problem and you can readily see the light of day shining ahead of you in these knotting affairs that seem to baffle us.

The older men who started in by tickling the virgin soil don't know what it means to have a worn-out farm, or did not know at first that you could wear out the soil. You have not stopped to think that in fifty years your responsibility to the human kind has trebled. Fifty years ago we had about 30 million people to feed. To-day, according to a statement made by the Census Bureau, we have 102 million people. If that same ratio is maintained for fifty years more what is going to happen? Your grandchildren and mine will be here with a population of 300 million people and perhaps more. We don't know what the effect of this world's war will have on us when it is over. I read in a Chicago paper that in December nearly three thousand children whose fathers had been killed on the battlefields in the old world, landed in Chicago. That means that those children have got to be fed from the farms and we have got to feed them. That means that we have to contribute of our mite to educate them and we have to work out these social problems so as to give all of them a fair chance in the world. We have got to go deeper in our pockets to contribute our part to maintain the institutions incident to the increased population.

In this State in eight years the appropriations have doubled. Eight years ago 20 million dollars would pay the expense of running your State

Government for two years. The last session of the Legislature appropriated 43 millions of dollars, and it means that you and I and every other citizen have the responsibility on our shoulders. A large part of this expense will come out of our pockets, and the time is ripe now to adopt a permanent plan of landlord and tenant that will increase our efficiency as farmers and maintain our fields and make two blades of grass grow where only one grew before.

The time is ripe for us to consider the problems that confront us as regards the relationship of landlord and tenant. Each owes an obligation to the other. All contracts are mutual. The very basis of all contracts is that they are obligations one to the other, equitable in their nature; and what more important contract was ever entered into than a long lease for a piece of Illinois farm land, where the tenant is remunerated for his labors and where the landlord is remunerated, reasonably, and also a provision for the permanent improvement of that farm.

You have other speakers to follow me and I thank you for the rapt attention you have paid me. My voice is failing me and again I thank you. [Applause.]

CHAIRMAN MARLIN. We will now hear from Dr. Dyson on "Tentative Plans to Control Hog Cholera." [Applause.]

TENTATIVE PLANS TO CONTROL HOG CHOLERA.

(Dr. O. E. Dyson.)

MR. CHAIRMAN, LADIES AND GENTLEMEN: I am somewhat out of place on your regular program. I trust that most of the people are interested in some possible way or means of controlling hog cholera. A few weeks after the first outbreak of the foot and mouth disease I went on record by making the statement that in all probability the outbreak of the foot and mouth disease would prove a blessing in disguise. I had entire confidence in our ability—that is, the ability of the State and Federal forces—to eradicate that disease and in the event of being able to eradicate the foot and mouth disease, I was confident that we could easily control hog cholera from which our annual losses have for many years past amounted to between three and four million dollars. I delayed presenting any plans for the eradication of hog cholera until I was convinced that we had the first outbreak of the foot and mouth disease absolutely under control. We had passed through a period of approximately one hundred days from the last outbreak of foot and mouth disease before we had the second outbreak, which was due entirely to the use of contaminated anti-hog-cholera serum. I don't think there is any question but what the first outbreak had been successfully controlled. I think the chances of a recurrence of the disease in the first outbreak was very, very remote. Just previous to the second outbreak of foot and mouth disease, I think perhaps a week, I prepared this tentative plan for the control of hog cholera. Had I been able to anticipate the possibilities of the second outbreak, I never should have presented the proposed plan for the control of hog cholera, simply for the reason that it was an inopportune time, I assure you. Everyone might say, "Concentrate on the eradication of the foot and mouth disease."

In order to have the proposed plan in a concrete form I have reduced it to writing and I will present it in that form, but in order that we may successfully control hog cholera or any other contagious or infectious disease, we must first have the cooperation of the live stock producer.

The State Board of Live Stock Commissioners and the State veterinarian can do practically nothing, that is, we can devote our entire time to devising rules and regulations and to discussing the various methods by which contagious or infectious diseases of live stock may be successfully controlled, but we can take but a few steps towards the control of those diseases without the cooperation of the live stock producers at large. Any effort that we may make towards the control of these diseases is in the interests primarily of the live stock producer. When this plan was first presented a provision was embodied therein providing for the division of public stock yards into a free and a restricted division. The idea was to separate the cholera infected

swine or swine from cholera infected premises at the public stock yards, that is, to prevent cholera infected swine and healthy swine, as well as cattle and all kinds of live stock from being unloaded at public stock yards indiscriminately through the same chutes.

A great deal of the cholera that we have had to contend with in the past has been distributed from the public stock yards. Regardless of the fact that we have the most rigid law upon our statute books of any state in the Union, the live stock producer has enjoyed the privilege of moving cholera infected swine, or swine exposed to cholera infection to market centers without any restriction whatever. If our present law could be enforced there is absolutely no question but what we could control hog cholera, but it would be at a tremendous economic loss, and an unnecessary loss, and furthermore, as I stated in the first instance, we cannot take a single step without the cooperation of the live stock producers. Now, this law is so stringent that public sentiment would be violently opposed to the enforcement of such a law, and there is no question but what it is absolutely impossible to enforce a law unless it has the backing of public sentiment. Public sentiment has got to be behind it. You might have a dozen State veterinarians in the State of Illinois and they could not enforce a law of that kind. I consider it an unreasonable law. With the cooperation of the swine breeder, I believe hog cholera can be controlled, but I do not believe it could be controlled by a threat to enforce the existing law, for the reason that this prohibits absolutely the movement of cholera infected or exposed swine over or on the public highway.

Now, in the event of enforcing that law what would be the result? It would mean that where we have cholera spread broadcast throughout the State, every man who owns a cholera infected hog would be prohibited from moving any of the herd to market centers, as long as he has the infection on the premises or so long as his hogs had been exposed to infected premises. That I consider would be a great injustice, if he only was compelled to hold those hogs on his infected premises he would either suffer the loss resulting from death or he would be required to spend several hundred dollars perhaps for anti-hog-cholera serum which does not serve a useful purpose after the infection has become firmly established. It would mean that every producer would be in addition compelled to spend his money for serum. I don't know where it would be possible to get enough to treat all of the infected hogs under those conditions, and then you would naturally look for greater losses. Now, I consider it perfectly safe to move cholera infected swine or exposed swine from cholera infected premises to market centers. The unrestricted privilege, however, of handling cholera infected hogs serves as a menace to the swine within the infected area. Carelessness and indifference on the part of the owners of cholera infected swine in seeking a market for their stuff must be changed, and we must impress on the owner of a cholera infected bunch of hogs that he has the privilege of finding a market for that stock, but that he must take some precaution against spreading the disease to his neighboring farms.

As a result of our recent experience in connection with the eradication of foot and mouth disease, I feel that it has been conclusively demonstrated that it would be possible to prevent the spread of the contagion of hog cholera from a large per cent of infected herds or premises and thereby ultimately suppress the disease, without seriously interfering with the movement of healthy swine to market centers, or even prohibiting the shipment of slightly affected or exposed lots to market for immediate slaughter under such restrictions as would effectively prevent the spread of the contagion of hog cholera.

The following is a tentative plan briefly outlined:

1. *Movements of Healthy Swine.*—Transportation companies before accepting shipments of swine consigned to public stock yards should be required to secure a statement from the owner in the form of an affidavit properly executed, to the effect that the swine offered for shipment are not affected with cholera and have not been directly exposed to the contagion by being moved from cholera infected premises.

In order to avoid inconvenience or delay on the part of shippers, local agents of transportation companies should qualify to accept acknowledgements in connection with the execution of affidavits. Owners' certificates covering shipments of healthy swine consigned to public stock yards at market centers should be retained for filing by the agent of the transportation company accepting the shipment.

Under no conditions should agents of transportation companies accept for shipment any swine consigned to the public stock yards or any other point within the State of Illinois, unless said swine are covered by an affidavit of the owner to the effect that said swine when offered for shipment are not affected with cholera and have not been exposed to the contagion thereof by being removed from cholera infected premises;

2. Movements of Swine Affected With or Known to Have Been Exposed to Cholera.—Unless covered by an affidavit of the owner as provided in foregoing section 1, all shipments of swine tendered to transportation companies should be classed as *infected* or *exposed*. Such *infected* or *exposed* shipments should be covered by a certificate issued by the agent of the transportation company in duplicate, the duplicate to be attached to the waybill, and the original forwarded to the State Board of Live Stock Commissioners, Springfield, Ill.

All *infected* or *exposed* lots of swine delivered to transportation companies should be loaded in cars direct from wagons or from pens set apart from regularly used yards. After delivering cholera infected or exposed swine to the transportation companies, the wagon boxes and receiving pens when used should be thoroughly disinfected by the liberal use of a three per cent solution of Compound Cresol, U. S. P. Under no circumstances should cholera infected hogs be permitted to be driven over or upon the public highways, or yarded in pens utilized by transportation companies at local stations for the receipt of any kind of live stock, either to or from market centers;

3. Disinfection of Infected Cars, Pens, Chutes, etc.—All cars in which cholera infected or exposed swine are loaded for shipment should be placarded by the agent of the transportation company and the waybills plainly stamped "Hog Cholera." The placards should be firmly tacked upon both sides of the car and bear the following printed inscription: "Hog Cholera—this car to be thoroughly cleaned and disinfected before being again used."

4. Treatment of Cholera Infected Swine.—Upon receipt of notice by the State Board of Live Stock Commissioners, to the effect that swine affected with or known to have been exposed to the contagion of cholera have been shipped in the manner above outlined, or upon receipt of notice from any other source of the existence of an outbreak of cholera, it shall be the duty of said board to immediately cause said infected premises to be placed in quarantine and require that all swine remaining upon said infected premises be confined within a limited area until officially released from quarantine.

All swine so held in quarantine should be subjected to the following treatment without delay: They should first be sorted into lots with the object of separating the visibly sick from those which show no evidence of disease. The temperature of each hog should then be taken and the entire lot subjected to serum treatment with the exception of such animals as may have reached an advanced stage of cholera. Such animals should be slaughtered immediately and their carcasses disposed of by being burned.

5. Cleaning and Disinfection of Infected Premises.—In from fourteen to twenty-one days after administering the serum to infected herds a careful inspection should be made and any animal in the lot then showing evidence of cholera should be slaughtered and the carcass properly disposed of by burning, thereby eliminating chronic carriers of the disease, now recognized as a constant menace to the swine breeding industry. The infected premises should then be thoroughly cleaned and disinfected in the following manner:

All rubbish must be raked up and burned or thoroughly limed and deeply buried. All hog houses or buildings to which hogs infected with cholera have had access, also partition fences, etc., must be thoroughly

cleaned and disinfected with a three per cent solution of Compound Cresol, U. S. P., to which a sufficient amount of quicklime should be added to plainly show the surfaces covered by the disinfectant.

All feeding platforms and ground surfaces of infected pens must be thoroughly disinfected by a liberal sprinkling of Cresol solution or by a solution of Chloride of Lime made by adding one pound of Chloride of Lime to three gallons of water.

Hog wallows should be dispensed with unless regularly disinfected by the use of either of the above mentioned disinfectants.

The liberal use of air-slacked lime in connection with feed yards and hog house floors is also recommended.

In the foregoing tentative plan for the control of hog cholera, only the fundamental factors involved have been briefly outlined. In order to successfully operate the plan the movement must be firmly based upon the ground of public policy. Therefore, it would first be necessary to secure the cooperation of swine breeders' associations, farmers' organizations and individual farmers who desire to protect their own interests. Bankers throughout the State should cooperate with farmers' organizations for the control of hog cholera by furnishing the means whereby a supply of anti-hog-cholera serum could be kept constantly on hand in cold storage at some central point in each county. By this means the discount obtained by the cash purchase of serum in lots sufficient to treat several hundred hogs would be sufficient to cover all carrying charges and still enable the owners of infected herds to purchase serum at less than prevailing prices. Furthermore, the fact of having serum available for immediate use would more than double the beneficial results ordinarily obtained by the use of serum as a passive immunizing agent. Cooperation on the part of the Federal Government would also be necessary to prevent the interstate movement of cholera infected or exposed swine to the principal market centers, unless the danger of spreading hog cholera infection is properly safeguarded. The proposed plan would no doubt serve every practical purpose.

While there is a formidable array of interests involved in the proposed plan which may possibly be looked upon by many as an optimistic dream, I am confident that the plan is practical and that it can be put into successful operation with the immediate result of suppressing at least 50 per cent of the annual outbreaks of cholera within the State, thereby cutting in two the annual economic losses resulting therefrom. I am also confident after a thorough organization and full cooperation of all interests involved with the object of rigidly enforcing regulations perfected by experience gained under the operation of the proposed plan, that hog cholera in Illinois can practically be eradicated.

In presenting for your consideration the foregoing tentative plan for the control of hog cholera within the State of Illinois, permit me to add that these are times of rapid progress and ways and means of preventing the spread of contagious diseases of live stock considered radical ten years ago are looked upon to-day as being ultra conservative. The greatest stumbling block that has yet been encountered in promoting modern means of preventing the spread of contagious diseases of domestic animals has been due to the fact that the personal interest of a comparative few has been permitted to dictate public policy.

Personally I am positively of the opinion that there is no more reason for hog cholera being permitted an unrestricted spread throughout the State of Illinois, than there is that hogs should be permitted by their owners to roam at large with the unrestricted privilege of destroying farm crops without a protest from the owner of the crops destroyed. The spread of hog cholera like that of all other contagious diseases is always due to a lack of sanitary control. The contagion of hog cholera is permitted to prevail by reason of the fact that no concerted effort has ever been made toward eradication. Therefore, carelessness and indifference on the part of swine breeders and live stock sanitary officials in general cannot be too strongly condemned.

The Cause, Nature and Means of Disseminating the Contagion of Hog Cholera.—The contagion of hog cholera is due to a filtrable virus, the virulency of which varies greatly. Hogs becoming infected with virus of high virulency, unless by reason of a great natural resistance ordinarily succumb to the disease within ten to fourteen days—a few may apparently recover, and thereby become chronic carriers of the disease for an indefinite period, and frequently as long as they may live.

The direct loss resulting from hogs becoming infected with virus of low virulency is usually confined to a small number of highly susceptible animals, the balance of the lot ordinarily becoming immune to a further infection. Chronic carriers of the infection, however, usually develop and prove dangerous to litters of pigs farrowed months after the disease had apparently run its course. Pigs even though infected with cholera virus of low virulency frequently develop cholera of the most virulent form. The passing of hog cholera virus through pigs always tends to increase its virulency. Therefore, unless sanitary measures are enforced to eradicate hog cholera, by destroying chronic carriers of the disease and by thoroughly disinfected premises, and by preventing the unrestricted movement of cholera infected swine, there is positively no means of protecting the swine breeding interests throughout the State and the country at large against the never-ending cycle through which the contagion of hog cholera is invariably spread.

In substantiation of the foregoing statements it is only necessary to cite the fact that the contagion of hog cholera never develops spontaneously and that the specific virus only finds a fertile field for development within the system of susceptible animals. Every drop of blood and every tissue of cholera infected hogs serves as a culture medium for the propagation of hog cholera virus. This in turn is scattered broadcast by urinary and foecal discharges; also by the whole or fragments of carcasses of hogs dying from cholera. Therefore, nothing can be accomplished toward the eradication or control of hog cholera except by reasoning from cause to effect and invoking the aid of sanitary science.

Now, gentlemen, in connection with this proposed plan it has recently been suggested that a county board of live stock commissioners be appointed in every county in the State, that is, that a board of three members should be appointed by the board of supervisors or county commissioners, whichever you may have in the various counties, that they should appoint three men interested or actively engaged in farming or live stock production. In counties where there is an agricultural adviser he should become a permanent member of that board. The county board so appointed should hold at least quarterly meetings and request all of the live stock producers or men interested in the production of live stock in their respective counties to attend these meetings. The secretary of the local board of live stock sanitary commissioners would keep a record of those meetings and there should be an annual meeting of these various county organizations held annually or semi-annually at Springfield, if you please, for the purpose of devising ways and means of promoting live stock sanitation. The report of the secretaries of the various county organizations could be published by the State Board of Live Stock Commissioners in pamphlet form as a survey of the live stock sanitary conditions existing in the various counties.

Now, with such a plan as this, your own representatives would be the men who would naturally be expected to take charge and carry it out. I believe it can be successfully accomplished at a great saving. Now, these proposed plans are the only ways for the control of hog cholera, also, if the opinion of the local county or the county board of live stock sanitary commissioners must receive the indorsement of the live stock producer, and those interested in better live stock sanitary conditions, within the State, in order that they may become effective.

I would like, if possible, to secure an expression of your opinion on these propositions, and I should also be glad indeed, if time will permit, for you to enter into a discussion of the hog cholera problem and would be very glad to answer any question that I may be able to.

Now, gentlemen, just take it into your own hands and discuss this problem freely.

Q. Do you find the use of virus all right?

Dr. DYSON. Yes, under certain conditions, there is always more or less danger, of course, connected with the use of virus for the purpose of immunizing swine against cholera.

Q. Which is better, the double or single treatment?

Dr. DYSON. It depends entirely on the conditions; in the use of the double treatment there are four factors to be considered, potent serum, virulent virus, and competent administration to healthy hogs. Now, if all those conditions are favorable, if you have all of those it is safe; it is not safe for you to attempt to use virus in connection with hogs that have been infected with cholera. Or, if you have a virus of low virulency and a serum of high potency you won't get immunization. You may feel you are perfectly safe, but you have simply got an immunity that would be produced by the serum alone. There is the danger too, unless the man is very careful and a good judge of swine, of permanently infecting them, any pig or any hog to which a double treatment has been administered. They used to preach that it was necessary to show evidence of the fact that they had an infection. Now, that is not the case. They may show slightly off, but the pig that acts sick and that shows evidence of cholera infection at the end of fourteen days is a dangerous pig to keep on the premises, for this reason; he may contract a chronic form of disease and apparently recover and yet for the balance of his natural life perhaps will be a carrier of cholera. That accounts, to a great extent, for the spread of cholera from year to year. I don't believe that anyone should take the chance in carrying that hog over, simply for the reason he will in all probability become a chronic carrier, not every hog, but a large percentage of them will. To be on the safe side never endeavor to carry over a chronic case of cholera.

Q. In your plan of county organization that is a board of live stock men in the county, you don't bring into that plan your assistant State veterinarians if you don't require the veterinarians of a county to make any report on farms where they may have seen or treated the cholera. I wonder why it is you leave your profession out; they could be of vital and helpful assistance in these counties. Why do you leave them out of our county plans? I am really interested.

Dr. DYSON. I am awfully glad you brought that to my attention. The idea is that with the cooperation of you people you will simply set the pace. The idea of this county live stock sanitary board is that they shall cooperate with the State Board of Live Stock Commissioners and with the assistant State veterinarians and with other veterinarians in the county. It is not possible for us to take the initiative on this proposition and to require every assistant State veterinarian or every veterinarian in the State to report an outbreak of cholera. We have no means of finding it, and we have got to get the means and then we will get the information. There would be thousands of reports come in. We know where they are. We know these things, we have cholera spread all over the State, but we have got to get an organization that will cooperate with us to control it at the point of infection. We can only do that through a committee or through a county board of live stock commissioners. We can appoint then a special adviser for your committees or require that everyone who knows of the existence of an outbreak report it. If we have the means of controlling it, after we get the report, then we will be in good shape to handle it, but to get the report in advance of the means to control it, it does not amount to anything. If we can get an organization, we will have ample means of finding the locations. This plan of shipping infected swine is one of the ways of getting the location and the man would report it himself.

Now here is how it should be organized. The local veterinarian, of course, is making his living by the practice of his profession in his locality, and if he takes it upon himself to report it, as he might under the existing law, anybody can swear out a warrant or file a complaint before the grand jury and secure the indictment of anybody that happens to drive cholera

infected hogs over the public highway; but they won't do it, but under this plan that man discloses the fact that he has cholera infection on his premises and then we would get the report and you nor no one else would be blamed for reporting that condition. We require, of course, where the serum and virus are used that the hogs be placed in quarantine for thirty days.

Q. What about the farmer who has a part of a car of hogs that are infected and he brings them in, but he has not enough to ship a carload and the shipper necessarily will have to buy those hogs and put them in with the balance of a car of well hogs?

Dr. DYSON. By eliminating the free and restricted area from the yards, that would not cut any figure; they would all go to the same place, but, Mr. Shipper does not buy cholera hogs unknowingly, he always knows when they are infected, and he must make his statement that that carload of hogs contained hogs that had been removed from cholera infected premises or that they were infected with cholera.

Q. When could these cholera organizations go into effect?

Dr. DYSON. Just as soon as the various counties signify their willingness, one or a dozen for that matter, or the entire one hundred and two counties, just as soon as they signify their willingness to proceed along that line.

Q. You don't have to have a lot for it?

Dr. DYSON. No. The idea is just to form a tentative organization and then to go before the Legislature and secure the enactment of a law and the appropriation of funds to pay the expenses of these various county organizations, and have an annual meeting. In case you wanted to secure the enactment of a law or the amendment of a law you would do it through this organization, if you please. With an organization of that kind you can rest assured the Legislature would enact it and no question about that. Look how many years it took to secure the enactment of the tuberculin test law, when we were the only State in the Union that did not protect its interests against the importation of tuberculous cattle from other states. How many years did it take? What was the result of our not securing the enactment of such a law? Why, the entire live stock interests of the State of Illinois were under suspicion by other states, and they would not permit the importation of cattle from the State of Illinois. Absolutely barred them. There is only one state in the Union to-day that won't accept a certificate of health from the State of Illinois, except for the embargo placed on account of the foot and mouth disease.

Q. Is the quarantine of hog cholera effective; for instance, there is an outbreak in the country and there is no treatment, no quarantine established?

Dr. DYSON. That is it; we are simply standing still. We are watching this disease spread all over the State and there has been no effort on the part of anybody to control it.

Q. Just goes from neighbor to neighbor?

Dr. DYSON. That is it exactly. Now, there is one thing about cholera; it never develops spontaneously, absolutely never, no matter what you feed them. It simply goes from one farm to another, from one district to another, and from one place to another; cholera travels in cycles. We haven't got much cholera in the State of Illinois at the present time. Now is the time to commence; it would be a bad time if we had it all over the State, but when the cholera reaches the low ebb, then is the time to undertake to control it.

Q. How big a per cent of cholera over the State is reported to you?

Dr. DYSON. We do not get reports; nobody reports cholera; they don't pretend to.

Q. What are the principal means of conveying it from one place to another—one community to another?

Dr. DYSON. In case a man has cholera developed on his farm, about the first thing he does after he has lost a few hogs and sees that there are quite a few sick he calls in his neighbors and asks them to come over and

help him haul his hogs to market, and they very obligingly come over and help him handle the cholera infected hogs, hauling them to market, working in the infected pens at the point of shipment and they go right back home out among their own hogs, carrying it right to them, no mystery about it.

Q. Don't you consider this is done a good deal?

Dr. DYSON. Yes, sir.

Q. Well, I don't believe in our neighborhood there would be a farmer who would go to his neighbor's but I would like to ask if that is the kind of a reputation our farmers have for selling cholera hogs?

Dr. DYSON. Don't misunderstand me; I think it is perfectly right and proper for a man to dispose of these cholera infected hogs. I don't think they should be required to hold them on the farm and spend hundreds of dollars for serum in treating hogs that would afterwards become exposed or possibly not infected at that time. I think it is perfectly straight, but, they should be handled under such conditions as not to expose the entire neighborhood, simply because one man is unfortunate and his herd becomes infected is no reason in the world why he should spread it broadcast to his neighbors.

Q. Well, nobody cleans out after they are handled.

Dr. DYSON. That is it exactly.

Q. Do cholera infected hogs make very good pork?

Dr. DYSON. Let me tell you, they don't get very far. They make good grease and good tankage, that is where they ultimately land. The Federal inspection is very rigid, I assure you.

Q. It is your advice to help clean up the farms?

Dr. DYSON. Yes, that is contemplated in this plan, that is, to supervise and see that they do it.

Q. For instance, I have got a sick hog and cholera is in the neighborhood, and it is one that has been ailing and I am suspicious of it that it has cholera, how am I going to determine whether that is cholera?

Dr. DYSON. The best plan is to take that pig up and get him off by himself as quick as you can, and take his temperature and if he has a temperature of 105 or 106, the chances are about 95 out of 100 you have cholera. The temperature will always give you a good line on the condition of the hog.

I thank you, gentlemen. [Loud applause.]

PRESIDENT TULLOCK. We are rapidly coming to see that cement is a very important factor, not only in the road and bridge construction, but also in farm construction, and the next number will pertain to that question. I believe Mr. Corwell will give you something on farm concrete construction.

CONCRETE CONSTRUCTION ON THE FARM.

(E. Z. Cornwell of the Portland Cement Association.)

MR. CHAIRMAN, LADIES AND GENTLEMEN: You are all more or less familiar with the work which the cement companies have been doing for a number of years past to give greater publicity to the value of concrete as a farm building material and as to the correct ways in which to use the material. Many of the larger cement companies have generously given of their time and means to spread the gospel of concrete. Of course, there has no doubt been at the bottom of their efforts a natural self-interest, since they would have a right to expect that eventually their efforts would yield returns.

The demand for such cooperation as the cement companies have been giving has grown recently to such proportions that it has become necessary for them to conduct their educational work largely from a central organization. This is known as the Portland Cement Association, which is maintained by the cement companies to educate all interested persons to the adaptability of concrete for the many classes of construction to which it is suited, and in which fields it is without a successful rival. The Portland Cement Association, which I represent, has therefore nothing to sell but

service, and the cost of this service is within the means of any person interested, since the only charge we make is that you express a desire for our cooperation. In the language of the man who wishes you to see his latest catalogue, "A postal card will do." That is the only expense to which you are put for such assistance as the Portland Cement Association can give you.

Concrete is of first importance as a building material in making for greater efficiency on the farm. Those of you who have used it in some of the various ways in which it is applicable, have realized that the permanent sanitary improvements which concrete insures, make farm tasks more pleasurable and less expensive; and no one will doubt for a moment that any one profits in the end if at any time in his life he contributes to greater efficiency in or of anything.

A consideration that is altogether too frequently overlooked in deciding upon a building material is whether the material chosen will protect against

exposure to fire. When fire starts among the farmers' buildings, it usually ends by leaving nothing but smoldering ruins. Too frequently it happens that all of the valuable stock representing years of savings, not to mention the entire season's crops, are destroyed by fire. For this reason the prospective builder can do no better at the start than to give due weight to the advantages of fireproof construction, and any material which is fire-safe is most certain to combine in a great degree the characteristic of permanence.

Probably no other material combines both of these qualities in a degree equal to concrete. That concrete is well suited to the requirements of farm structures is not to be doubted. If you could see the thousands of letters of inquiry that annually come into our office, you would realize that the gospel of concrete has been well spread and that all progressive farmers have either used the material in some form or are on the verge of doing so.



All of us have some traits in common. Most of us are largely influenced by what our neighbors do, and no doubt many of you have used concrete because of its successful application by one of your neighbors or are about to do so for the same reason. But like any other building material, concrete gives best results only when used in ways and for purposes which practice has proven best. Many who have used concrete have not had the results of their labors turn out thoroughly satisfactory. This is unfortunate since every instance of dissatisfaction with any material is likely to keep a farmer from making use of it unless he is educated to know the cause of such dissatisfaction and how it might have been prevented. For most classes of concrete work on the farm, no extraordinary ability nor skill is required. The rules that govern good concrete work are simple to understand and equally as simple to follow. There is one point that should, however, be borne in mind. In most, if not all, classes of concrete work every

one of these fundamental rules is just as important as any other one, and it is quite likely that neglect to observe one requirement—one which may seem relatively unimportant—will be the fundamental cause of dissatisfaction later. I cannot bring this one point too strongly to your minds. For instance, the importance of using only good sand is often underestimated or entirely disregarded. Many persons think that all of the success or at least the greater part of it in concrete work lies entirely with the Portland cement. This might be true if there were a lot of disreputable cement manufacturers in the country who would perhaps live up to their unenviable reputation by marketing an unreliable product. As a matter of fact, cement has become so standardized, owing to the necessity for manufacturers meeting certain specifications which have been proved necessary for the material if it is to be used in building construction, that a cement manufacturer could not survive as such if his product were undependable. Portland cement to-day is an exceptionally reliable product. Being a manufactured one its quality is under absolute control, and if properly handled between the times when it is purchased and put into a concrete mixture, no one need fear that any resulting dissatisfaction in the concrete work can be traced to the Portland cement.



The pictures which I will show you to-day will illustrate only a few of the many ways in which concrete has been and may be used. They will give you an idea at least of the opportunities which you are neglecting to make your farms expense-proof—to make labor once expended count for all time.

SAND AND PEBBLES.

In the picture of the gravel pit which we now have on the screen there is shown a pit where the material happens to be very uniform as to the grading and percentages of the fine and coarse materials, that is, the sand and pebbles. This, however, is a very unusual condition to find. Nature did not expect that eventually her storehouse of this material was to be tapped and used in a manner in which it has for some years past. Most so-called gravel banks or gravel pits contain material which in its natural state is, for one reason or another, not suited to use in concrete mixtures without some special preparation. More frequently than not, material is excavated from such a deposit without having stripped the overlying soil, and loam and vegetable matter drift down over the face of the pit, thus mixing these objectionable materials with that in the gravel bank. This,

however, is not the only fault of natural bank-run material. Almost invariably such deposit contains twice as much fine material (sand) as pebbles, while for good concrete work the materials should grade in a ratio practically the reverse.

Sand in a concrete mixture is usually defined as that fine material excluding dust, ranging from the smallest particles up to those that will just pass a $\frac{1}{4}$ -inch mesh sieve, while the material that will not pass such a sieve is known as gravel. Unfortunately the word "gravel" does not convey the meaning that it should in connection with concrete mixtures, since the arbitrary use of this word has been responsible for many persons making the mistake of using in a concrete mixture the natural run of bank material, in which the sand and pebbles are always in uncertain and varying ratio. Therefore a natural mixture of sand and pebbles as found in the ordinary gravel bank should not be used until the material has been passed over a screen and the sand and pebbles separated so that the two may be proportioned correctly. The expense thus incurred is more than counterbalanced by the increased uniformity and strength of the concrete and is economical in the use of cement also.



Concrete construction.

Voids, or air spaces, contained in any given bulk or volume of pebbles are about 45 per cent of the mass. In order to fill these air spaces and make a dense concrete, the amount of sand should be approximately half the volume of pebbles. If unscreened bank-run material is used, a greater quantity of cement is required to fill these air spaces. The amount of cement used in a 1:2:4 mixture, for instance, provided the 2 cubic feet of sand and 4 cubic feet of pebbles are well graded is 1 sack (1 cubic foot), and this is sufficient when thoroughly mixed with the 2 cubic feet of sand and 4 cubic feet of pebbles, to coat every particle of sand and form a sand-cement mortar which will fill all of the air spaces in the pebbles. If, however, these proportions were changed and twice as much sand as gravel used, the 1 sack of Portland cement would be far less than necessary to thoroughly coat the increased number of sand grains and fill the air spaces between them. So weak and porous concrete would result.

Watertight concrete may be secured for all practical purposes even where there is a considerable "head" or pressure of water, by using well-

graded, correctly-proportioned materials, with enough sand and cement (sand-cement mortar) to overfill slightly the air spaces between the pebbles. No two loads of bank-run material from the same pit contain the same relative proportions of sand and pebbles, consequently concrete made from such material is not uniform, dense nor watertight, nor so strong as it should be.

Bank-run material must be screened by separating it into at least two volumes, the sand being that material which will pass through a screen having four meshes to the linear inch (16 meshes to the square inch), the pebbles or the material usually referred to as gravel, being that which will not pass a screen having $\frac{1}{4}$ -inch meshes and consisting of particles ranging in size from $\frac{1}{4}$ inch up to as large as proper to use in the class of construction to be performed. For foundation work, for example, 2 inches is often an allowable maximum size for pebbles or broken stone, while for concrete fence posts and other concrete products the maximum size may be fixed at $\frac{3}{4}$ inch for fence posts, silo staves, concrete block, large concrete pipe and tile, and $1\frac{1}{4}$ or $1\frac{1}{2}$ inches for other work.



A common rule in concrete construction is that no pebbles or particles of broken stone used in a concrete mixture shall exceed in greatest dimension, one-half the thickness of the concrete section in which it is to be used. This refers more particularly to concrete products such as pipe and tile; but does not mean, however, that such maximum size may always be used.

Many conflicting and sometimes confusing opinions are advanced as to the effect produced on concrete by the presence of a small amount of clay, loam or other foreign material. Certain principles, however, are fairly well agreed upon. When clay exists as a coating on the particles of sand or pebbles, it is undoubtedly injurious, as it will prevent a proper adhesion or bond between the cement and the sand or pebbles. For this reason one should be careful to use only clean sand and pebbles. Rotted vegetable matter, usually spoken of either as loam or organic matter, is also injurious. A very small quantity of such material tends to prevent the cement from performing its bonding or binding action, by keeping the particles of cement apart. Usually concrete made with sand containing loam hardens very slowly and sometimes will not harden enough to permit the concrete being

put to its intended use. Washing and screening bank-run material is neither a difficult nor an expensive operation and can easily be accomplished wherever there is running water. Any means which will agitate the materials and allow the lighter foreign material to run off with the water, will accomplish the purpose.

Water used in concrete mixtures should be clean. Not only should there be no loam, clay or other foreign material in the water, but it should be free from oil and excessive alkali. Water that is fit to drink is best for mixing concrete. Alkali in mixing water may not only be the cause of a whitish deposit on the finished concrete, called efflorescence, but if in excess, may finally effect the strength of the concrete.

Strength and density of concrete are dependent upon correct proportioning of all materials. Strength, of course, depends in part on using clean, hard, durable sand and pebbles, while density depends largely upon



correct proportioning—yet both strength and density are results of observing the same fundamentals.

PROPORTIONING CONCRETE MIXTURES.

Proportioning of materials must be such that the cement will coat every particle of sand, and the sand-cement mortar will coat every pebble or particle of broken stone and be slightly in excess of what is actually required to fill the air spaces, or voids, in the mass of pebbles. Unless these conditions are secured, the concrete will be porous, hence not watertight, and the sand and pebbles will not be firmly bound together into one mass by the cement. In other words, the amount of sand used should slightly exceed the volume of air spaces in the pebbles or broken stone, while the quantity of cement used should slightly exceed the voids, or air spaces, in the sand. If these principles of proportioning are carefully observed, the resulting concrete will be practically free from air spaces, consequently strong, dense and watertight.

Compressive strength of concrete, which is the ability to carry heavy loads placed directly upon it, also increases with an increase in density.

There are a number of ways to determine the volume of air spaces in a given bulk of sand and pebbles or broken stone, so that the materials to be used for any concrete mixture can be accurately proportioned to reduce air spaces to a minimum. But for extreme accuracy, rather complicated methods must be used, and it has therefore become a more or less general practice for the home worker to rely on so-called arbitrary mixtures, which are recommended when the sand and pebbles or broken stone have been selected so as to insure materials of uniform grading from fine to coarse, with the coarser particles predominating.

A table of such arbitrary mixtures follows, with suggestions as to the particular classes of construction or parts of construction to which they are suited. In this table the figures stand for the volumes of the cement sand, and pebbles or broken stone used. For example: A 1:2:3 mixture means 1 sack (1 cubic foot) of Portland cement, 2 cubic feet of sand, and 3 cubic feet of pebbles or broken stone.

A 1:2 mixture means 1 sack (1 cubic foot) of Portland cement and 2 cubic feet of sand.



Manure pit.

TABLE OF RECOMMENDED MIXTURES.

1 : 1 : 1 Mixture for

The wearing course of two-course floors subject to heavy trucking, such as occurs in factories, warehouses, on loading platforms, etc.

1 : 1 : 1½ Mixture for

The wearing course of two-course pavements, in which case the pebbles or crushed stone is graded from ¼ to ½ inch.

1 : 2 : 3 Mixture for

Reinforced concrete roof slabs.

One-course concrete road, street, and alley pavements.

One-course walks and barnyard pavements.

One-course concrete floors.

Fence posts.

Sills and lintels without mortar surface.

Watering troughs and tanks.

Reinforced concrete columns.

Mine timbers.

Construction subjected to water pressure, such as reservoirs, swimming pools, storage tanks, cisterns, elevator pits, vats, etc.

1 : 2 : 4 Mixture for

Reinforced concrete walls, floors, beams, columns and other concrete members designed in combination with steel reinforcing.

Concrete for the arch ring of arch bridges and culverts; foundations for large engines causing heavy loading, some impact and vibration.

Concrete work in general subject to vibration.

Reinforced concrete sewer pipe.

1 : 2½ : 4 Mixture for

Silo walls, grain bins, coal bins, elevators and similar structures.

Building walls above foundation, when stucco finish will not be applied.

Walls of pits or basements, subject to considerable exposure to moisture but practically no direct water pressure.

Manure pits, dipping vats, hog wallows.

Backing of concrete block.

Base of two-course road, street and alley pavements.

1 : 2½ : 5 Mixture for

Walls above ground which are to have stucco finish.

Base of two-course sidewalks, feeding floors, barnyard pavements and two-course plain concrete floors.

Abutments and wing walls of bridges and culverts, dams, small retaining walls.

Basement walls and foundations for ordinary conditions where watertightness is not essential.

Foundations for small engines.

1 : 3 : 6 Mixture for

Mass concrete such as large gravity retaining walls, heavy foundations and footings.

1 : 1½ Mixture for

Inside plastering of water tanks, silos, and bin walls, where required, and for facing walls below ground when necessary to afford additional protection against the entrance of moisture.

Back plastering of gravity retaining walls.

1 : 2 Mixture for

Scratch coat of exterior plaster (cement and stucco).

Facing block and similar concrete products.

Wearing course of two-course walks, floors subjected only to light loads, barnyard pavements, etc.

1 : 2½ Mixture for

Intermediate and finish stucco coats.

Fence posts when coarse aggregate is not used.

1 : 3 Mixture for

Concrete block when coarse aggregate is not used.

Concrete brick.

Concrete drain tile and pipe when coarse aggregate is not used.

Ornamental concrete products.

TROUGHS AND TANKS.

Probably most farmers who have been attracted by the possibilities of concrete have first tried out their skill in constructing a watering trough or tank, and it is probably true that some of such concrete tanks have been unsatisfactory, so some first attempts at concrete work have been discouraging. The reason for this is simple. If the concrete has not been properly proportioned or placed, or if these requirements were observed, then little or no reinforcing was used, or if used, was improperly placed; and when the construction was finished no precautions were taken to prevent the concrete from rapidly drying out. Hence, the tank leaked. The concrete was soft and porous. Or, perhaps the foundation was not properly prepared and an unequal settlement resulted in cracks.

A concrete trough or tank should be built in one continuous operation to avoid the construction seam or joint that follows leaving of concreting one day and resuming it the following day.

For tank construction a rich mixture, such as 1:2:3, in which well-graded sand and pebbles are used, is the one for tank or trough construction.

The limited time at my disposal prevents my going into detail on every class of concrete construction which I shall call to your attention. However, I can promise you the free services and free publications of the Portland Cement Association, to give special attention to your individual inquiries which will aid you to solve in advance your various concrete problems.

CONCRETE SILOS.

All of you have, no doubt, reached the point where you appreciate the great advantage and economy of feeding green, succulent food to stock during the winter. The silo has revolutionized dairying and some phases of stock feeding. The advantages of the silo have become so generally known and appreciated that the only question to be decided by the farmer to-day is what type of construction will prove best from the business, that is, from the investment standpoint. This question involves not only first cost but also cost of maintenance, interest on the investment and depreciation. If low first cost is considered of prime importance, perhaps concrete would not always be selected, but carefully considering all of its advantages against those of any other silo construction materials, concrete stands conspicuously foremost. It is only natural, therefore, that this type of silo should find first favor with the progressive farmer. Concrete is also adaptable in silo construction in that it can be used in several ways as monolithic construction or in the form of concrete block, or as cement stave.

**CONCRETE FENCE POSTS.**

The use of concrete fence posts has been increasing at a rapid rate for a number of years which is explained perhaps largely by the scarcity of suitable fence post timber in many sections of the country and the consequent increasing cost of wood posts. It is quite evident that the demand



Concrete fence posts.

for fencing will be greater in the future than it has been in the past, and also that the modern farmer will demand permanence since he has become tired of the annual replacement of wood posts and the continual necessity for straightening up fences. In the matter of first cost, the wood post now

has little, if any, advantage, and as regards length of life, freedom from possible damage by fire, rotproofness and stability, the concrete post is in a class by itself.



Concrete manure pit.

Another point that is sometimes overlooked is the fact that concrete fence posts can be made in winter during what would otherwise be idle days. All that is needed is a good tight shed where the temperature can be maintained at 50 degrees F. or above, and a supply of frost-free stored materials arranged for before winter sets in.

Just as in the case of any other manufactured product, the quality of the concrete post depends upon the qualities of the materials and workmanship used. All that is necessary to secure first-class fence posts is to observe a good concrete practice, which experience has pointed out as necessary to success.

CONCRETE MANURE PITS.

One of the ever-present problems before the farmer is the maintenance of soil fertility. The silo and dairying solves the problem in part; the concrete manure pit does the rest. You business farmers to-day realize the great value of manure, and appreciate the necessity for returning to the soil as much as possible of what was taken from it.



Concrete feeding floor.

Concrete floors in the barns with concrete gutters leading to the concrete manure pit, insure the conservation of all stable wastes, and will solve the problem of maintaining soil fertility.

CONCRETE FEEDING FLOORS.

Among the farm appointments that can be secured through the medium of concrete, none is easier to build nor more certain to give good returns on the money and labor expended, than a concrete feeding floor. Cattle fed in cleanly surroundings gain more rapidly in weight and naturally are more certain to be free from disease than where kept in surroundings that are the reverse. Feeding stock on concrete floors, as many of you know, reduces the labor of feeding considerably.

There are two types of construction used for concrete feeding floors which are nothing more than a series of concrete walks laid side by side, and the same principles of construction which apply to walks apply to floors, and vice versa.

In one-course construction a relatively rich mixture is used throughout, such as a 1:2:3 or a 1:2:4 mixture. In two-course construction a leaner concrete, such as a 1:2½:5 is used for a 4-inch base, with a 1-inch top or wearing course of richer (1:2) proportion. The greater ease with which one-course floors can be constructed makes this type preferable for paving feed lots and barnyards. Do not over-trowel floors and walks when finishing. In fact do not use a steel trowel, but finish with a wood float, thus preventing a slippery surface.

In all concrete work you should be impressed with the fact that every recognized requirement of good practice should be observed, otherwise the one seemingly unimportant omission may result in dissatisfaction. Protect your concrete work against rapid drying out by keeping it covered for several days after the last concrete has been placed. This is quite as important as using good materials and correctly proportioning and placing them.

Within the lives of many of us gathered here the farms of this country must be rebuilt, and I am certain that you progressive farmers will realize that you can select no more advantageous material with which to build enduring structures, that are fireproof, rot-proof, rat-proof, cyclone-proof and sanitary, than concrete. I thank you for your attention.

PRESIDENT TULLOCK. The announcement for this evening is that we will have discussions on cooperation and club work, and we have a full program and all speakers will be here and I would like to have everyone in attendance.

We will now adjourn until 7.30 p. m.

WEDNESDAY EVENING SESSION.

7.30 o'clock p. m.

PRESIDENT TULLOCK. We will begin our program to-night by a few words from the young people who are to give these talks, and I would like to have them come forward and sit on the platform.



Concrete well platform.



We will hear first from the corn club boy from Macon County, Robert Wilson.

HOW I MADE MY CROP OF CORN.

(Robert Wilson.)

MR. PRESIDENT, AND OTHERS: After trying for four years, I was gratified by receiving the annual prize of the Macon County Boys' Corn Club. The first year I found I was a very inexperienced corn grower, when it came to doing all of the planting myself, so I read all of the material I could lay my hands on on corn growing and listened to suggestions from experienced men. These I put into use and raised about seventy bushels of corn which is about ten more bushels than I had been getting, and the next year, 1913, when the corn was planted we had a severe drought, which ruined the corn. I determined to be prepared for drought the next time, and so early in the spring I put fifteen loads of manure on the ground and this was thoroughly disced and it formed a loose mulch, and 1914 was a drought year too, but this mulch held the moisture and not nearly so much damage was done. Last year I bought five hundred pounds of acid phosphate and stored it on the ground and then I double disced it and plowed it under. Good seed corn was hard to get, but after it was all planted it was worth the trouble. After it was up I planted my missing hills with a hand planter. Last fall during the latter part of August a violent storm blew this corn down and that diminished the yield approximately ten bushels; the corn yielded only ninety-four bushels.

I thank you. [Applause.]

HOW I MADE MY CROP OF CORN.

(Rodney B. Rigor.)

MR. PRESIDENT, LADIES AND GENTLEMEN: You recall the story from the Bible of how Jacob of old sent his sons to Egypt to buy corn. In the early days it was a common custom for Central Illinois to send to Egypt or Southern Illinois to supply them with corn. We still continue extensive corn raising down there.

I am informed that Pope County has the greatest yield of any county in the State for the year 1915 produced by a contest in a boys' corn club. We have a corn club of 152 members of which I am vice president.

The plot I selected for my club corn is located eight miles west of Golconda on Robnet Creek. My plot was six rods wide and twenty-six and one-half rods long. The soil, a dark sandy loam, was very fertile and well drained. For six years this plot had been a pasture for cattle.

On the 29th day of March I plowed my ground the first time. I put a cutter point on so I could slice the sod up neatly and not skip any. I let the ground lay undisturbed until the 5th day of May, then I took a disk cultivator and turned all the discs one way and disked the ground about four inches deep. I then took a section harrow and harrowed it twice before planting it. On the 6th day of May I planted my corn. I made the rows about 32 inches apart with a single shovel plow and drilled in the corn about nine or ten inches in the row. The day following I closely harrowed the plot which left it in an excellent state of cultivation. On the 17th day of May I replanted the places where I had a bad stand. Later I found this to be a mistake as the replants did not produce any corn. My corn would average about twelve inches in the row. The 31st day of May I hoed it and on the 1st day of June I plowed it with a shovel cultivator about four inches deep, using small shovels. The 5th day of June I turned the small shovels to turn more soil to the corn and plowed it again. On the 14th I placed the large shovels on the cultivator and turned all the soil to the corn I could. June 25 I turned a small ridge to the corn with a turning plow. July 3 I laid it by by hoeing out all weeds and grass.

Prof. Muckelroy's advice was Boone County White corn for bottom land. I followed his instructions and found the results to be good. The season

was extremely wet. When the corn was in the milk stage a heavy rain followed by a high wind blew my corn flat to the ground and badly damaged it. My yield was 137 bushels and 37 pounds. Conservative estimates placed my loss by blowing down at 30 bushels. Many visitors came to see my corn and invariably pronounced it the best they ever saw. Many stalks were fifteen feet tall and seven and a quarter inches in circumference, having ears weighing two pounds. From this I selected ten ears that filled a half bushel measure and the ten ears weighed twenty-three pounds.

The rules of our boys' corn club require that the plot be measured and the corn gathered and weighed by two disinterested men, nonrelative to the contestant. These men are required to fill an affidavit to that effect and file it before the county superintendent of schools. I sold fifteen bushels of seed corn and made a net profit of \$67.25, outside of premiums won in contests, which amounted to \$28. My father produced on the field adjoining my plot about fifty bushels per acre. I thank you. [Applause.]

Mr. MOFFET. I come as a representative of the Union Pig Club of Modesto. I was an extra slipped in on this program. I will give you a short history of our club. Mr. P. C. Coots of near Modesto aroused interest among the boys and girls about organizing a pig club. He did not cease his efforts until the Union Pig Club was organized with a membership of eleven. All of the boys and girls stayed with it and raised a pig. These pigs were shown at the Palmyra picnic in August where they were judged by Mr. Baumgardner of the State University. They were to have been shown at the State Fair but on account of the prevalence of the hoof and mouth disease we were not allowed to take them. Although we were greatly disappointed about this, we were much pleased with the many compliments which we received from the Illinois State Live Stock Breeders' Association and also with the certificate which we received from the University of Illinois. As soon as I became a member of this pig club, the first thing I had to think of was the selection of a pig. As my father's stock were all grade pigs, he did not want me to raise one of those and he offered to buy me a good pig but I did not want it; I wanted to see what I could do with grade stock, so I began to look over our bunch of pigs to see if I could find one which would be suitable for me. After going to a great deal of trouble and with my father's help I finally selected a pig. It was a large male pig having a good form and nice, smooth red coat. This pig and another one which I put with it to keep it company I put in a three-acre alfalfa field, about a week before the feeding period began.

On June 15, when the feeding period began, Ty Cobb, that was my pig's name, weighed about 106 pounds. At first I started feeding him a mixed ration as the bulletin suggested, which consisted of one-fourth pound of corn, a half a pound of shorts, two gallons and a half of milk and one ounce of tankage. I found that one of the most important things in feeding a pig is to feed it regularly; a pig is just like a human being, if he don't get his meals on time he gets peeved and naturally loses a little bit of weight, so I fed him at six o'clock in the evening and five o'clock in the morning. About three weeks before my pig was to be shown at Palmyra something got the matter with him and he began to fall off in weight. I soon found he had worms, so I cured this by giving him turpentine in the food. Although he began to pick up weight rapidly, at the picnic he was not in the best shape and weighed about 158 pounds, having gained on an average of one pound per day at a cost of eight and one-tenth cents a pound.

From then on to the end of the period, October 15, the food ration which I used consisted in a greater part of corn, having about three pounds of corn and two pounds of shorts, two gallons of milk and a small amount of tankage, and alternating the tankage with some oats every other week. At the end of the feeding period he weighed 222 pounds, having gained almost a pound a day at a cost of about eight and a half cents a day. Although some of the pigs in the club had gained about two pounds a day at a cost of about eight cents a pound, this is due largely to the fact that they had been fed on a dry lot, that cutting down the pasture bill which was three cents a

day. I think most of the other members agree with me in saying that the pasture bill was a little high, and pigs did not get the full benefit of the pasture, when they were getting all they wanted without it.

I believe the benefits of this club will be seen and recognized very soon, and if this club work goes on there will be a new brand of farmers seen in this country whose trade-mark will be registered on every farm.

Another thing is the driving home of the fact that the grade pig is not as good as the full blooded stock. A grade pig may take on as much weight in the same length of time as the full blooded stock, but when you get two loads of them to the market together, the full blooded stock will make a better appearance than the grade stock and will naturally bring a little better price. This club work is also good for boys and girls to keep them interested, so that they are going to want to stay on the farm; they see that there is good profits to be made by staying on the farm and they are going to stay and make it pay, whether their fathers did or not, because they will be better equipped. [Applause.]

PRESIDENT TULLOCK. The next is the pig girl, Miss Fern Dobbs, of Girard, Ill.

Miss FERN DOBBS. I am here to-night to tell you about how I raised my pig. This summer I went to spend my school vacation with my uncle and aunt, Mr. and Mrs. Clark Mills of Modesto, Ill. I had been there about a week when I went to spend a day with Mr. and Mrs. I. S. Riggins, whose daughter Chloe is secretary of the club. Chloe wanted me to enter a pig. I first did not want to, but after thinking it over, Mr. Coots, the president of the club, was informed and he at once sent in my application for membership. A few days later I received a very cordial letter from James H. Greene thanking me for my application and wishing me success. The more I thought about this, why, the more my interest in this matter grew and one day Mr. Coots came over and helped me select my pig. As my uncle had Duroc-Jerseys, that was the kind I fed. I like the Duroc-Jerseys because they are well shaped and grow to a large size if proper care is given them. I selected my pig because he fulfilled these requirements, he was long, thick loined, with a broad back and smooth coat and stood up well on his feet. The first thing I did was to name him; I called him "Buster." At first I tried to tame him, and I could not get near him, but then I took him in hand and it was not long before I could go up to him anywhere and he would lie down and let me scratch him. I talked to him and when I called him by name it was not long before I could stand at the house and call Buster and he would come to the house and meet me. When I wanted to bathe him he would lie very still, and when I got through scrubbing one side he would roll over for me to scrub the other. [Laughter.]

What I fed him consisted of milk, tankage, shorts and corn. At the beginning of the feeding period it was quite difficult and I had to learn the right amount to feed him. The way I mixed the feed was: I first weighed the milk and then the shorts and then mixed those and then the tankage and mixed it well. If the batter was thick I would put in enough water to make it thin. I soaked the corn I fed him. Each time I would put the corn in and soak it for the next feeding. One day my neighborly adviser was over and said I was not making my batter thick enough. The next week I tried to make it thicker and my pig had been gaining about one and one-half pounds per day but that week he began to gain only one pound. I asked my uncle about it and he said he thought it was feeding the thick batter so I tried the thin and that week he gained two pounds per day. I believe that the thick batter was the reason that Buster gained only one pound per day during the week before, for he did not seem to eat it as he did the thinner.

A short time before the Palmyra reunion I noticed my pig was beginning to wrinkle. I did not know why. I inquired and I was informed I was not giving him enough exercise, and I was told I should walk him at least one mile per day, and I did so. I noticed that the wrinkles began to disappear, but they did not disappear before the Palmyra reunion.

I began to feed him June 21 with six pounds of milk, one and one-half pounds of shorts, two ounces of tankage and two pounds of corn per day. July 1, I was feeding him nine pounds of milk, two pounds of shorts, two ounces of tankage and two pounds of corn. August 1, I was feeding ten pounds of milk, three pounds of shorts and two ounces of tankage and two pounds of corn. August 17, the close of the feeding period, I was feeding nine pounds of milk, three and a half pounds of shorts, two ounces of tankage and two and one-half pounds of corn. In the 56 days I fed 511 pounds of milk, 125 pounds of shorts, 98 ounces of tankage and 1,152 pounds of corn. He was on blue grass pasture, three cents a day, and the total cost of feeding was \$9.29. The weight of Buster beginning at the feeding period was 91 pounds and his final weight was 177 pounds, which was a gain of 86 pounds. I fed him twice a day, six in the morning and six in the evening. I have learned a good deal about raising pigs. For instance, in feeding them you must feed them at a regular time and give them the best care.

I showed my pig at the Palmyra reunion, taking second prize, and some thought I had a fine pig. I have my plans made for the club work next year and I am going to buy a pig from my uncle and give more time to him than I did to Buster.

This club work is a great thing for the boys and girls of this State and other states and I hope there will be a good many more join us next year.

I thank you. [Applause.]

PRESIDENT TULLOCK: The Canning Club of Macon County will be heard from now.

Miss LUCILE HELPHINSTINE. I am a little girl only ten years old, I am the oldest member and the youngest girl in the Macon County Canning Club. Although a little girl cannot do as much as a big girl she can do a great deal more than one would think when it comes to things like this.

At first I did not feel disposed to enter for the prize, until it was too late for some things. I have worked very hard and tried to get everything that was to be canned after I decided to enter for the prize. I helped to can everything that was canned at home. We have 500 quarts in our cellar and I am proud of the fact that we have not bought one single can of goods this year.

I also helped the neighbors to can during the summer after school, and though I have not much time for canning, I found time after supper and Saturdays to can many of my varieties. It takes energy and courage to enter for such a prize as this, and many times I felt like stopping, but each time I took new courage. Now, I am very glad I did. I like the kind of a girl that goes at a thing and stays with it and not go back, not back out. People who take the easy path in the world are people who never get along, for when they come to a hard place they stumble and fall. Those who take the path that is before them are the people who succeed.

My mother and I worked together during the summer and we find it is much more pleasant for two to work together than one. I know I am a little girl, but I am not afraid to enter into a contest with big girls. It is very easy to say I cannot, but if I keep on trying I will find that I succeed. I intend to be a club member as long as I am within the age limit. This is my first attempt but I have had many experiences. Most of my experiences have been with tomatoes. In the spring a ton of manure was put on my ground which has been plowed and harrowed. I put out all my garden then. In the month of May I also set out my plants and hoed them too in this month. They were carefully looked after, being hoed six times and handled by hand once. The sun was quite severe during this time, and the rays came down very strong on the fruit and we were trying during this time to save some fruit, we worked carefully in the hope of saving some of the fruit but were unsuccessful. Not to be defeated entirely we kept on working and this method proved quite beneficial because our yield was increased. I had three different plantings in peas. The first planting was so long that the wire fence which was around it became a support to the peas, and thus they required no sticks.

We canned all of the fruit for the table. The second planting came up well, but blew over before they were staked, and that did not bear as well as the first planting. We used all of the fruit from this planting on the table. The third planting bore the best and largest peas of all. We made 22 quarts of peas from these plantings.

I had several different kinds of beans to choose from and I think the Kentucky Wonder, the best for all types. I canned 24 quarts, all of which kept nicely. We set out three quarts April 17, two quarts of red variety and one quart of white variety. When we gathered them in in the fall we found we had three and one-half bushels after using them all summer. They were carefully cared for, being hoed six times and weeded by hand three times. Peas were sowed the same day. Onions were set out and came up very thick; they came up so thick that we transplanted the row to another part of the garden. I grew two rows of peanuts in my garden. The rain hurt them so much we saved only one bushel. My crop was light.

When I joined the canning club the canning club committee decided that the girls entering for prizes might can anything that grows in Macon County, so I set about finding different things that are grown in Macon County. I saw growing, 43 varieties of vegetables and 31 varieties of fruits. All of these are not grown on our farm or in our garden but I have attempted to secure as many as possible. My father feels the result of this in the saving on his grocery bill. You will find in my exhibit 98 different cans of fruits and vegetables. Part of these came from our own garden and from other gardens, some bought from the neighbors and some given by friends and some gathered along the roadside in the timber, for example, dewberries, wild blackberries and elderberries.

A study of these products grown in our county made it necessary for me to study the different dishes to be prepared on our table, such as kidney beans, string beans, succotash and green peas, as well as tomato soup and tomatoes in every other way. I learned, for instance, that if cucumbers are given a hot and cold dip they retain their natural color and when this process is used it makes a very pretty can of pickles.

I worked very hard in my work this summer and I like my work and I hope every girl will find it a success. I think every girl over ten years should be interested in canning.

My motto for the past year has been: "If at first you don't succeed, try and try again."

I thank you. [Applause.]

PRESIDENT TULLOCK. The next number will be an address by Mr. Benson on the "Social Significance of Club Work."

THE SOCIAL SIGNIFICANCE OF CLUB WORK.

(O. H. Benson, Washington, D. C.)

I am sure you are sorry, ladies and gentlemen, that the program you have been hearing is not going to continue. I have never yet found an audience that was willing to give up the live young speakers you have been hearing to-night for any adult that ever appeared on the public rostrum.

I am happy to be here to-day because I have seen with my own eyes what Illinois is willing to do, what she can do and she has done. A year ago last July I was invited to your State by Mrs. Hatch, the chairman of the Educational Committee of the Illinois Federation of Women's Clubs. I came to Dekalb and spent three days with a body of mostly women who came from different sections of the State, to get acquainted with one single activity connected with the household science, namely, home canning. I went from there down to Aurora and spent three days with another body of people, and we had at that time, I believe, something over two thousand women, mostly, and some young people and some men. When I suggested that you can can anything that grows out of doors, on tree, vine, shrub or out of the soil, that you can can it so it will hold its color and it will be true to nature in texture, flavor and color, some of you doubted it, but you don't

doubt it to-day because you have got the goods from your own homes over here on the shelf.

IMBEDDED WITHIN THE HOME LIFE.

If there is a man, woman or child within my hearing to-night who has not taken time to see all of the exhibits of canned goods, the exhibit of corn over in the building yonder, you ought to be ashamed of yourselves to stay in town a whole day and not see it. There are the 98 varieties of this little mistress of the Illinois home, this little lady of the home, the ideal of American citizenship, if you please, because there is no citizenship that does not have its mooring and have its ideals perfectly imbedded within the home life of the communities we represent.

You have had a delightful demonstration here this afternoon—that fine young array of men and women—and to-night the kind of lecturing you are to hear will not be so satisfying because it has been punctured through and through with a view of life.



An exhibit of canning club products.

Years ago in Illinois and Iowa I was connected with the institution methods, and I used to say to my people in Iowa, "I wish you folks would get busy and bring to your institutes and your short courses and your schools of instruction a message made to order for the boys and girls on the farm and for them alone," because I know many and many a time I have sat back in the audience with the old and the young and every institute lecturer, every professor from the college institution department, would come there with a good message, yes, but made to order for the man, the adult farmer and occasionally for his wife—and I would like to put the question mark after the occasional, because they did not think in those early days much of the wife, even. They soon began to wonder back in that state why it was that the Iowa youth was gradually migrating from the farm, and the Iowa farms were shipping their young people to the city, to the railroad shops, the trolley lines, and some of them to your city of Chicago; they were then beginning to ask the question, "Why is this con-

dition of things?" and the answer began to come back, and come back with no uncertain tone. They soon knew why they had been depleting rural communities in Iowa of the boys and girls, the young blood of rural life.

There is but one safe ideal to establish in the education of the people and that is to give a very large proportion of your educational work to the young people who are in the majority, without prejudices and with a brand new outlook on life. I have many times gone to farmers' institute programs and I have talked about crops and home ideals and about the reorganization of farm communities so as to make net profits and so on, and I have had the farmers sit there and nod their heads with me all of the way through, and here a year later I began to inquire about that community and I find that this was true, that though they voted with me and endorsed what I presumed, and I presume a large number of them believed the truth of what I said, but to change the habits of a farmer that have been formed for twenty-five years is nearly a physical impossibility. But much more so is it a mental impossibility.

I would not have you understand for the world that you cannot change adults, I am not talking about one hundred per cent of the people now, I am talking about the majority of them, and when I am talking to you I am talking to the other men and women that have preceded you, because you represent the type that will change to-morrow, but only a small per cent of the adult farmers and farmers' wives of Illinois will not. If you extend a message of welfare to the Illinois farmers you must extend them that message to all kinds, in a form that will reach the majority of your people and reach that class of people that cannot pay the freight and have not the time or money to attend your university, your colleges and your higher schools of learning in this State.

You ought to be glad your State University has established an extension department, and you ought to be glad she is putting into your State and into your counties men not to criticise you, men and women not to correct you, but men and women who work with you and hold out to your young people such hopes, and bring them into the limelight of achievement. The greatest business of education to-day, as I understand it, is to set up a standard of measurements for rural people.

NOT MUCH ABOUT FARMING.

If there is any one thing we farming people do—and I say that because I lived on a farm until I was twenty and I know the language of milking fourteen cows in the morning and milking them again at night and doing the milking, if you please, before sunup and after sundown and I know the language of going to bed with tired hands and aching bones, as a young boy. Hard work was not a mystery to the country boy at all. I learned, as many a country boy and girl did in the younger days, that they did not do anything but give us a chance to get up early in the morning and work and hustle all day and go to bed at night, and then hold it out at the public schools to us, the idea that all the great men were politicians and statesmen, and oh, how little did we hear about that great man, the farmer, that citizen of the highest type. I never saw upon the public school walls of the schools I attended the photograph of a farmer. Never. I never read from the printed textbooks about the poetry or the literature of farmers. And, yet the finest literature and the finest poetry that God Almighty makes on earth can be written about the American farmer and his business.

You have heard from the brown-handed children of Illinois to-day, and I do them honor, I doff my hat to the achievement of these young people. Are you utilitarian enough, Mr. Average Farmer, Mr. Average Homebuilder, are you utilitarian enough to believe for a single moment that all of the value of this club work is wrapped up in the canned goods and in the corn and pigs? Why, of course not.

ONE THING AT A TIME.

I get now to my subject of the social significance of this work. The biggest part and the most important part of it by all odds is that part of

it that pertains to the social community of the rural communities. But you have got to consider, my friends, that if there is any one thing that we institute people and we extension workers do that is wrong it is this: We feed you too much at one time, but when we deal with children we won't have to study and learn and discuss, if you please, two dozen things at once. Then we wonder why we fail. People say to me, "Mr. Benson, you are a crank about this canning business," and I frankly admit I am a crank in the canning business for a number of reasons; first, because it is the finest key I ever carried—it is more than a golden key of opportunity, it is the best diamond key that I ever carried, the diamond pointed key that unlocks the door at the right place, the American home, namely, through the kitchen.



He spent hours in the long rows watching the wonders that nature was working.

The extension worker that undertakes to approach the American rural home by way of the parlor fails. The extension worker that approaches Mr. Average Farmer and his family by way of his back yard, slips up on him quietly and inoffensively and gets his canning key out and unlocks the door to the kitchen. Once in you have that home won for better things, and for greater things you have that home won. So you can talk about the readjustment of your kitchen, of the labor-saving devices, of energy-saving devices and the greater amount of time available for the farmer's wife or her family for culture and for reading and recreation, but I want to emphasize this point. In all types of extension work, whether through the county

agricultural agent or by special or county farmers' institutes and lecturing, please remember the old adage, "One thing at a time." It is worth thinking about when you approach the average community. Second, have that one thing lead to the big thing—that is the social community. Don't ask me why, you know. Why do you have to call this work "club work?" It wasn't for the want of a better term, it was for success and cooperation.

We organized the boys and girls into groups, about the community center with the idea that through that club we could get the team work, if we had the lines out, and used that crown that we thus formed. We will show you a few groups taken in different places, as we pass along.

The boys and girls club work should, when it has the proper social significance, be a twelve months job. The object of the group is to develop cooperation and a successful working together.

Some two years ago I went back to my native home in eastern Iowa, and I went to the community where for many years I had been hauling milk from my little farm to the cooperative creamery. I drove down to this creamery and when I approached it I found the yard was covered with weeds, and the paint was scaling off of the building, but over the door on the front I could read still in somewhat indistinct lettering these words: "Farmer's Cooperative Creamery," and I thought back over the years I had spent in this community and I remembered that they organized at one time a cooperative creamery made up of the farmers surrounding that village, and as I remember they were squatting around in little groups and they were having their word feuds and they were having their jealousies and they were having their envies, they were marshaling these forces of evil to get it out of here, that cooperative idea, and I have been disgusted since I saw that sign and since I reviewed my own experience in connection with it. For this is especially true, that if you are going to teach men and women of the future to be real cooperators and to do team work and sink self for the sake of the community, you have to begin with the boys and girls of to-day and teach them cooperation through the social club training.

This is a group of boys, a social community, that you will find in the villages, that you are now beginning to find through the country. These people are gathered in small village towns as you see them flipping pennies and learning their first lesson that leads down grade. And the next step will be with the cigarettes and the tipping of liquor which leads down to the depths of vice. It is out of a school of this type that we fill our penitentiaries and reform schools, if you please, and indirectly this develops a class that we fill our insane asylums with, and other institutions which are so expensive to the welfare of this country. I would like to have you folks help your leader Mr. Greene of the State University and his able assistants and local workers and cooperators to transform all of these canning groups of the State of Illinois into one central instructive canning club, pig clubs, corn clubs, potato clubs and other clubs which are outlined in his list for the coming year. He will need help, the State of Illinois is big and the calls are many. To get at the work necessary to make follow-up work efficient will require your whole-soul cooperation for the good of the children of your farms.

Here is a group of corn club boys, boys in the village. To be sure their acres are around town, some of them as far as three or four miles away, but the only inactive member is the little fellow in front, and he is not so inactive, he is getting a few of the real ideas that will lead to achievement later. The thing I am interested in in connection with this crowd is first of all its cooperative enterprise. They meet every two weeks and have two or three speakers on the program when they meet. They have a business association presided over by the president, and I had the pleasure of attending it. I shall never forget the manner in which that little man stepped up and brought his gavel down on the table and said, "The club will come to order." It did. He says, "We will now listen to the reading of the minutes of the last meeting," without a word of hesitation, in the same spirit of achievement which you heard from these young people this evening, and I heard the program, and then they put on this little debate, "Resolved that

shallow cultivation is better in this community than deep cultivation." I learned some things there that I did not know, although I had cultivated ground for many years and studied it in different states of the Union. They had been getting some pretty efficient help from the State institutions and the local leader.

After their program had been carried on that way they had a form of free-for-all discussion. One little fellow—I shall never forget the black hair and black eyes of that boy—stood up on his feet and he said: "Mr. Chairman, we have a visitor in the room and I would like to suggest that he be asked to offer a few words on this occasion." I had slipped into this little assembly and I did not know there was a boy in the room that knew about my presence. The local leader did not even know I was there, but they knew that it was a tall, slattern, lean looking fellow that they had not seen around there, and they just took it for granted that it was a book agent or something and they thought it would be a good thing to hear from him,



A canning club in action.

so I had to make a little speech. When this thing had been carried on for about an hour it was immediately followed up by about thirty minutes of the finest kind of social life among the boys. They shook hands like they used to do in the old times, in the olden time Iowa camp meetings. They chatted with one another and asked each other questions: "How did you get along cultivating your corn over there?" and different interesting questions. I stood there and I said to myself, there is the ideal that will have to be worked out for the boys that live in the country communities. It is being done nobly and well, and it only requires a little money and much help and much leadership from intelligent people like you.

I must pass on quickly. You have the advantage of me to-night because I have to take a train. Here is a group of children that constitutes a home canning club. This group of girls meet every two weeks for the entire year. I wish I had time to tell you quite in detail something about the program. They go at the business earnestly and conscientiously, training one another

to be leaders, to be community leaders, if you please, and then they follow that up from time to time with a program which I heard while I was with them. It was about the culture side of home life, what kind of books to have in the home, what kind of papers to have in the home, what kind of discussions to have during the breakfast meal, the noonday meal and the evening meal, and the parents and children working together, and again helping one another to correct their English and become better conversationalists and so forth. Then when I looked over the printed program and found that they had one evening devoted to the subject of the study and care and feeding of the babies, I sat down in deep thought on the progress and development of American education for American girls. Another program was styled, "The Farm Home," another the "Poultry," another, "The Kitchen," and another "The Store Room," and there were several more of them during the year; some were on canning, and so on and so on for the twenty-four programs that they had during the year, covering practically the entire field of home economics, home interest. Every single one enrolled under one and that was canning vegetables. They started out on the same keynote, and through that social group they have unlocked the door to a field of knowledge on all of those things so vital to home building and home life.

This is followed up by another group—this is another group over in the city of Providence. This shows the spirit of the city of Providence. A teacher of domestic science in the high school organized and enrolled this crowd of girls and taught them through that common subject, home canning. All they canned they bought; as most of the girls did not have a garden they had to buy on the local market, all of the peas and corn and beans and other products necessary in order to learn their lesson. At the end of the year they checked up all their costs and all of their receipts and they found that with an expenditure of \$45 they had made a net profit on it of \$65.80, when everything was purchased by these girls, showing that even when you purchase the fresh product you don't lose money, but that it is profitable to can.

The interesting thing in connection with that group was the fact that they had sewing lessons, though canning was their project; they had social lessons and lessons on table manners, and they prepared several lunches and served their own meals and served the things they had canned, prepared them for the table and had them ready for eating.

Here is a group down in an Ohio City, a group of mostly factory people working by the day wage. Those folks are very much in need, very much in need, indeed, of a little holiday; not only the boys and girls that are growing up, not only that, but the adults are in need of the social advantages of that kind. I hope in the State of Illinois this coming year every community represented here will have your help to organize these social groups, for the sake of the future country life, that it might be properly conserved. One of the important things in connection with this work is the utility of can making, the sanitation advantages that come out of it.

AMERICA'S GREATEST ENEMY.

This is the back yard of a place in Portland, Oreg., and we discovered in that a breeding place for insects, pests, diseases, germs and a breeding place, if you please, for crime. I know of no better place to get first information and ideas of evil thoughts than in the filthy and unclean spots in the suburbs of a village, town or city. What I say to that will apply pretty well to the open country. There is no reason why these barnyards and the back yard, immediately back of the house should be littered up with all broken down machinery and everything else under heaven, that will bring disgust to the artistic side, if you please, of country life, but the boys and girls were harnessed up to this big job, like we are in our cooperative social communities and they pulled that out of the mire, and they are pulling it out of the mire all over the United States, this army of three hundred thousand boys and girls. That army is arrayed against America's greatest enemy, and I may say to you that while the preparedness program is popular

there are two sides to the program of preparedness. The one we are talking about particularly is the one with reference to the future character of the community building. The preparedness that will protect our economic life as well as our mortality against, if you please, America's greatest enemy, bugs and insects, diseases and germs of plants. Do you realize that every day in the summer one single plant bug will waste millions of dollars? Last year it was estimated that one single insect that worked on only one single economic product of this country wasted \$646,000,000 worth of wealth, and then if we should multiply that by the number of insects which are destroying all of the time, your corn, your wheat, your alfalfa, your horticulture, your fruits, your plants and all of the other things that constitute the foundation of this country, you begin to perceive what it means if you allow this great enemy to continue at work at the very vitals of this great republic. We are only assisting the thing that can only be equaled in time of a great war calamity, if we do not attack it vigorously.

On the other hand do you realize from the standpoint of mortality that the ignorance of needs of feeding, proper feeding and care of the babies is responsible for the deaths of millions of our babies every year? Again do you realize that the typhoid germ is destroying more people per day in certain months of the year than an army of an enemy would be able to destroy. I could linger here for some time in this strain of argument, but it needs no further argument, I think you know as well as I do, or perhaps some of you better, that what we need to-day is to muster an army of the twenty-two million boys and girls of America and to show them how to struggle with the potato masher and the canner and all those instruments, and with those instruments of construction, battle against these enemies to which I have referred.

I would like to draw your attention now, quickly, to three months later in Portland, Oreg., where they have battled successfully against the common enemy there as you can see by this picture. In the language of the little boy who gave me the definition of achievement: "Achievement," he said, "is getting into the game and staying in the game and completing the job." These fellows entered the game and stayed in it and finished it, like those young people that are represented on your program.

This is the same back yard you saw a minute ago, but an altogether different one.

One of the important social divisions of your boys and girls working is to bring them together for group instruction. The coming together as neighbors is inevitable, but we must cooperate if we are going to bring about the best things in country life. Here is where the local leader meets all the boys and girls and adults, and they distribute their little circulars which are followed up by instructions, and I want you to know that this is one of the public schools' best laboratories.

Will you please encourage your county superintendent and your public school teachers to come to your farm and use your barnyard and your kitchen and your orchard and your stockyard, your poultry and your whole farming place as a laboratory for the school. You have not down here in the past been able to give a farm to every school, so the thing you ought to do is to offer your own farm to use for illustrative and demonstration purposes. Some of the best work I have ever seen in agriculture has been carried on in this way where the public school teacher has certain days in the week when they take a whole group of children out to the man who has pure bred hogs and they study hogs, and then the next week they go out to the pure bred poultry and the next week to the horticulture and the next time to the orchard and so on, and the next time to the alfalfa fields, and I want you to know that those trips do a great deal of good for the school and they are a great thing for the community.

Another type of the field meeting is where the leader meets a group of children out in the open country, or in the suburbs of the village. This is a leader in the state of Idaho, who went out to meet with the local leader and demonstrated to the local leader how to conduct a field meeting. They spent an hour and a half with this group, telling them about insect pests,

diseases and how to cultivate the land and how to test soil for acidity and a number of other things, interesting and important, that were reasonable.

Another important phase of the follow-up work after you organize the social crowd is to give as many club members as you can personal visits. Here is a local leader visiting one of the club girls, that is a ten-year-old in her garden. While he visits this garden and the little girl, first he encourages the little girl by congratulating her and commending her for what she has done worth while, and necessarily always following that up by a suggestion. "Now, Miss Mary, don't you think you can get those weeds out of those tomato plants over there and then prune this little lateral vine so as to make the fruit come to head quicker and mature a few weeks ahead of time and get it on the market a little earlier in that way." So he gets the economic instructions in there at the right time. And third, to give these children of the open country or the village the opportunity to come together—they all need it—and to give them the feeling that somebody is interested in their individual development and welfare. Nothing like it in the world; men and women, all of you want inspiration that will go with you through life, and I hope you will assist the club girl and the club boy next summer in their work.

Look around there; this has got the electric current that will put the enthusiasm into you if you have not lost the real ardor of life. Much of this is hand work. I am bereft of much opportunity to see this, but no power can keep me from getting out in the summer. I hunt for a place to get out and see the children at work and shake hands and talk with them, and do it first hand. I think I would rust on my job if I did not get that first hand enthusiasm. I think I need it to keep the spirit in my work and get the point of view that is up to date.

Here is a group of children that managed and marketed a garden together with three women. They shared expenses and shared receipts and made an average net profit of \$8.21 through the marketing of fresh products and through the marketing of canned goods. They had a considerable garden; you see but one corner of it. In that way they were able to buy to advantage and sell to advantage.

A little back yard that for the first time in its life put on a good dress. The dress it had worn for generations was what you might call a tin-can convention dress and a rubbish habit and ashes that had gathered from time to time because there was nobody to carry them away. They did not want to pay for the hauling, and I presume there were relics here that had been left when they completed this little tenement house. What a fine thing for the boy and for the family community, for the city or town to get this little spot dressed up and incidentally to put into the jeans of that little boy a net profit amounting to a little over eleven dollars.

The boy that won first prize. If you can, remember my friend, when you earned your first money as the result of your own achievement, time, money and energy spent. How much more interesting a point of contact you had with life itself then. That is all the young people need on their farm and home life at the present time. It is an important thing to fill the minds and hearts of the boys and girls during the waking hours. When they work it teaches them habits of thrift, the idea of efficiency and management of good farms and brings its own results in the future. A little boy in a large city taking a little plot 22 feet wide and 48 feet long. He has farmed that little plot since the time he was ten years old, for three summers. He has in the bank \$92.80 to his credit which he says is the net profit on the investment. This boy says, "I would like to add another project to my work this summer; I want to put on a poultry club," so he selected his own poultry—went out to one of the leading poultry fanciers, of the country, and selected six of the best chickens the man had.

The picture that just passed the screen. The good book has recorded many miracles and we have been told this is not the day of miracles. Don't you believe it. There are many miracles being performed in the back yards of Illinois every day during the summer. I want to ask you to give a boy a man's job and to give a girl a woman's job. I say that they are not afraid

of a man's job in Illinois. This young lady that talked so fine about her pig and how he rolled over for her to scratch him on the other side is certainly a recommendation of the young woman's achievement; that young girl would not know the language of quitting; you could not teach it to her. She has passed the stage of inclination along that line.

This is a little boy, with all of his old pals and chums in the community calling to him over the fence, "Come on and play, boy, come on, you are a kind of a mamma's kid hanging around home, all of the time," and he just laughs in that optimistic way and says, "Naw, I must hoe my row."

A little boy down in one of the western states says, "My garden is not big enough," and the leader said, "Farm your posts," and he dug around both sides of the posts and he put gourds at one hole and pumpkins at another and so on for fourteen posts, and they helped him to win first place. That is intensive farming which is an element in the country and in the city.

Back in Portland, Oreg. Here is a garden of a boy not present at the time and his little sister and brother who want to get into the game as



Utah poultry champion at State Fair exhibiting and advertising at the same time.

they always do, a wholesome indication of the future. We went back in there and found the garden in that condition and I said, "Why not give the city boys and girls rural opportunities?"

Here is a boy that did not have much land and he conceived the municipal idea of building the garden in a skyscraper, with four stories.

This little fellow said, "All right, if I am going to be a farmer I must do business right," and he has a little office in the corner of his father's desk, in the corner of the home library, where he has his records and keeps his books and costs and everything, and at the end of the year this boy knows which enterprise made the most money. He knows whether there is any profit in cabbage or whether there is any profit in tomato plants and everything else, because he has a business in that garden in the back yard. Then he finds that he has to cater to the needs of the market, and he must provide that market through the back door and through the back gate up to his yard, and he must know that he has to deal fair with them or he will never

sell them again, he must give them the right kind of measure. If you want to teach them honesty there is no better way than to put them into competitive business.

This is a little boy over in Lincoln, Neb., where they do things with a vengeance. The city superintendent hired people to do itinerant teaching, to talk to the young people out in the suburbs and around the town, and they have a meeting and they talk to them and teach them these different things, and then they went over to the vacant lot and put up plants and marketed their produce.

This is a boy on the way home from market; he is delivering his last parcel of goods; he is going to leave it at a customer's home. And our Mr. Feasor from the Washington office saw this young man and he said, "Where have you been?" And the boy said, "Down to the children's market." "What have you been doing down there?" "Selling my vegetables, of course." I think you should get tired going down there and standing all day, working hard to grow your vegetables and then standing down there all day selling them; what do you get out of it?" And that little fellow with a smile from ear to ear went down into his pockets, down to the northeast corner of his pocket and pulled out the change and said, "See there," and that was the net profits on his investment. It was the correct answer to his problem of arithmetic, and agriculture. He was proud. He could do things that the man could do. Give the boys and girls men's jobs, don't offer them kid's jobs; if you do they will run. One of the best judges of the State was one of the many professional and business men patrons that always bought his vegetables down at the children's market. Now, all of these children grouped their crops under the name of the club or social community. You notice the banner, that represents the club. Every member of that club has a right to market the stuff there. The McKinley Club is the name from the school from which these children came—McKinley School—and every child of that club that had goods to sell met there at eight o'clock in the morning and stayed until the goods were sold. Another view of the market. The Capitol Club, that represents the club of children on the properties around the State Capitol. Constantly in the environment of the leaders of the State.

Let us pass over to New England, down in Rhode Island, one of large suburbs. We come on their festival day and find this group of young boys and girls, that I told you about; their parents were working in shops and factories. Most of these boys never knew what it was to be harnessed up to things that meant an honest holiday and thrift and education. You can understand what they have gained in the past summer in the production of this exhibit of marketable food products for the community.

A little girl in another village out in the back yard. This girl, like a young lady that spoke this afternoon, had poor health and her parents had been advised they had better take her to Colorado and to keep her out in the fresh air. The mother who was wiser said let us try the girl in the fresh air of our own home community, and they suggested that she go to the club meeting and get inoculated and then go to work with the garden. And she began to work back in her own back yard and the doctor at the close of the summer season said the little lady would not need to go to Colorado. They saved an enormous expense, probably they saved breaking up that home, they saved putting the father into debt because he was a clerk working at a very small salary and could very ill afford to take his daughter to Colorado. This was a year and a half ago, to be more accurate a year ago, and as far as the doctor knows she is as healthful as any girl in her neighborhood to-day. The next photograph illustrates a group of three girls. You notice they take advantage of the parcel post method of reaching the consumer. They ship their canned goods properly wrapped and their fresh vegetables. They made up boxes and they secured their customers something in this way. They went around and visited in certain sections and secured orders from people who would take an assortment of six or five or three of their varieties of products once a week, as long as their products would last. Ten cents for each can or twenty-five cents for each can accord-

ing to the needs of the family. These young ladies made a very handsome net profit from their work.

I hope every man will take advantage of looking at the color arrangement of these food products over there, and resist the temptation; by the way, don't open the jars.

I would like to give you just a bit of information in regard to this canning work while we are waiting for the next slide. I checked up 1,809 people who had been canning for themselves, boys and girls, and we tabulated what they had made during the year, and it amounted to 211,000 quarts of fruit and 227,000 quarts of vegetables. Please note they can more vegetables than fruit, a thing unknown to the canning people when referring to the home. The low commercial estimate of the price would be about fifteen cents per quart, and the lowest possible wage you can give to it, multiply fifteen cents by your total and you get \$67,000 worth of food products put up by the 1,809 people. I wish I could give you a bit of the commercial value in more detail, but I did not take much time to figure it. I would like to have you know what I know about Illinois, but I do not have the records to multiply the amount accurately and give you the result. I am sure Illinois in the past year has saved many thousands of dollars of food products, and incidentally saved some doctor bills, although, some of the best friends I have on earth are doctors. Incidentally, they are going to save some patent medicine bills.

The 4-H brand label used by the Salmon Canning Club along the Columbia River in the state of Washington, showing how they save fish that cannot be marketed or taken care of in any other way. Our State leader, Mr. Newhall, when he went down there saw great quantities, the finest salmon that swam in the Columbia River, and the cannery would not take them and the people left them lying there. The State leader seeing this condition conceived the idea that if you can can vegetables you can can salmon, and he is absolutely right about it and he went to work and organized clubs for that purpose and the amount of saving accomplished there by the boys and girls along the river is marvelous.

The connecting link between home work and school work. How these girls meet together and work out these common problems in a social way. We find like the old-time quilting bee and the sewing circle that the highest type of social intercourse is made possible over the country through canned goods.

You need but to go over and look at the exhibit to see the result of the excellent work that has been carried on in Macon County. I wish to congratulate all of you good people, you women especially, who have given so freely and unselfishly of your time, energy and devotion to this cause. I hope regardless of what may happen in the future you will keep these things not only alive but growing so that five years from now Decatur will not have a building sufficiently large to house an exhibit that may be offered from the members of this particular county.

One of the great normal schools of the East. This is one of the finest ways of connecting up the work. The normal school with the community extension work. Of course the State leader was mighty glad to have them explained on the Saturday afternoon, with the aid of these pupils of the normal school who are to be teachers in State universities. They canned these various things, asparagus tips, sweet corn and vegetables. The quantity you see before them there. You can see back of them the home they came from and you can look ahead of them and see if you please the home they will preside over and the children they will lead and educate, and the community that they will influence, and that they will help to build. There is the program of the boys' and girls' club. It is Nation wide. I wish I had time to finish my message but I think I will have to stop with this photograph or this illustration.

I have some twenty or thirty slides on this same lecture that I would like to have shown you, but I talked too much and have shown you too little. I hope to have an opportunity of hearing much about the excellent

work you people are carrying on in this State and I congratulate the Farmers' Institute on the delightful program I have heard here to-day.

I heard some of the best things I ever heard in my travels from state to state, here to-day, and it is quite worth while for you to come together in this way and go back with the message. Will you not advance the democratic work you have heard from this platform? I want you to hold up your hands all of you that believe in that kind of work, that you have heard about this evening from the platform, and put a little energy back of the hands when you get home, please. [Applause.]

BOYS' AND GIRLS' CLUB WORK IN ILLINOIS.

(James H. Greene.)

It was not long ago that Rev. Warren H. Wilson, the great rural church authority, wrote these words:

"Every creature on the farm is known; his life history, his ancestry, his habits, his affections, the time and manner of his birth, the occasion and probability of his death. All these are known about every creature on the farm, except one, from the mighty horse to the microscopic enemy that lodges in the muscular tissue of the hog. No scientists have until recently studied the most important animal of all, namely, the man who owns the land, the farmer himself."

But times have changed. We are realizing more and more that farming is a mode of life as well as a business. The importance of driving home the lessons of good stock and proper soil treatment cannot be overestimated but if the end of all this is but better stock and better crops instead of better living its arguments lose half their force.

But I would not be understood as striking a pessimistic note in such a meeting for it would be a false one and out of place. We are in the midst of an age of altruism. Better living and closer cooperation are the "two watchwords of Illinois agriculture." One has but to examine the program of these meetings to see that this organization is in the fore rank of this movement. It has done wonderful things for the farm homes of Illinois. It has helped to lighten the tasks of many hard-worked farm women by the advocacy of labor-saving devices in the farm home. But I believe that what you are doing for the farm boys and girls in giving them a place on your program is one of your most worthwhile pieces of work.

It seems to me that the business of making our boys and girls into efficient citizens is one that should engage the attention of every agency interested in better agriculture. I hold no brief for a better baby contest but if it has that aim in view it has a place in a State Farmers' Institute.

When Abraham Lincoln was making a tour in the East, a certain man was introduced to him.

"Are you a newspaper man?" asked the President. "I have seen you in almost every audience I have addressed lately."



J. H. Greene, State Leader, Boys' and Girls' Club Work, Champaign, Ill.

"No," was the reply, "I am a professor of rhetoric at Harvard and I have been listening to your speeches, hoping to discover the secret of your powerful oratory. I have been unsuccessful, but perhaps *you* can tell me what *you* consider the secret of your language in reaching your hearers."

The President thought a moment and then replied, "I can remember as a barefoot boy in hickory shirt and galluses standing on the edge of a crowd, listening to a speaker. I could hear but I could not understand. Then and there, I resolved that should I ever become a public speaker, I would choose my language so as to reach that barefoot boy on the edge of the crowd. Whatever success I may have enjoyed I attribute to that."

Illinois' barefoot boys of to-day are her men of to-morrow. If the best thing of to-day's agriculture are to continue, we must interest these boys and girls in them.

In the open country, free from the sham of town and city, the home, school and church, those beacon lights of civilization, stand out in bold relief. We look to them. Are they doing their full duty? One can only answer that question intelligently and fairly by comparing pictures of past and present conditions.

What of the barefoot boy of a generation past? Many of you can paint this picture better than I. Too often, his home was a place of hard work and few pleasures. He worked for Dad but had no money. It was a red letter day when he got a dime for the circus. His school was a boxlike structure containing a battered globe, a dented water bucket, and some town maps. The curriculum was but a cheap imitation of that of the city school. The term was just as short as the directors could make it, and the teacher the cheapest money could buy. The little old red schoolhouse turned out some fine men, but no thinking man desires a return to those conditions.

What about the church? Too often it had a dwindling congregation presided over by a discouraged minister.

The gulf between town and country was so wide that when the country boy went to town he was held up to ridicule. A prominent Champaign County farmer once told me that his experiences were so bitter that the necessary trips to town became a torture.

But we are well launched in a new era. Rome was not built in a day. It will take some time but the barefoot boy is coming into his own. Illinois may well be proud of its farm homes, its schools and its churches. All over the State there are fathers and mothers who are seeking means to interest their boys and girls in the farm and in the home. There are teachers who want to connect up the home and the school and make work in agriculture and home economics more real. Yes, there are rural churches with ministers who make theology take a back seat for boys and girls, and agriculture. All of these want help and direction with this one problem. What a chance for cooperation!

What organized effort has done in cities it can do in rural districts. A certain man was much amused at the dexterity with which his colored coachman killed bumblebees with the whip lash as they drove along the country road. His amusement turned to alarm when he looked ahead and saw a hornet's nest. "You are not going to kill the hornets are you?" he asked. "No indeed, sah," was Sam's reply, "Ise gwine to let dem alone, dey's organized." The importance of organized effort cannot be overestimated.

The United States Department of Agriculture has maintained for some time a division to look after work with rural boys and girls. Many of you are familiar with the National Boys' and Girls' Club Work and know that on June 1 of last year the College of Agriculture took up this work in Illinois in cooperation with the United States Department of Agriculture. During the past club season there were 6,032 boys and girls working independently and in 487 clubs in the State. These young business men and women produced \$31,063.33 worth of products.

Thirty-nine boys and girls enrolled in the pig club which was fostered most effectively by the Illinois Live Stock Breeders' Association. Twenty-

three boys and girls handed in completed reports to our office and received an achievement emblem, a lithographed diploma and five dollars from the association and a diploma from the State Board of Agriculture. The work which the Illinois Federation of Women's Clubs did in the canning work would take more time than I have to tell. The excellent work in Macon County speaks for itself.

Every American boy and girl likes a job but resents a task. Perhaps you did not know that there is a difference. Prof. Puffer tells a story of a boy who burst into the dining-room where his father sat at breakfast and said, "What can I do to help you to-day, Dad? I want to do something."

"Well, son," was the reply, "Do you see that pile of sand out there? You can wheel it up to the other end of the garden."

"All right," said the boy, and with a whistle on his lips he went to work. But the job did not last long and he was soon back again.

"Job's done, Dad; what can I do to help you, now?" Now the father, like a great many other American fathers, thought only of keeping the boy employed.

"Oh, just wheel it back where you found it," was his reply.

The boy thrust his hands into his pockets and walked from the room. His whistling had ceased. He found that his father had given him not a job, but a task.

The Junior Extension Service, the cooperative agency of the college and the United States Department of Agriculture, is interested in helping boys and girls find jobs. We carry on this work by means of projects. A project is a plan for carrying out a job.

In Illinois we have the following projects: Corn, pig, poultry, potato, garden and canning, mother-daughter canning, garment-making. The Junior Extension Service furnishes plans, outlines, demonstrations and short follow-up instructions during the growing season. But each community must furnish the leadership to undertake the work.

Here is an opportunity for the parent and teacher. The work is carried on at home but the school has all of this material to draw upon. These club members will show you far better than I can tell, the educational possibilities of this work. A composition is play when one is writing about one's own experiences in feeding pigs or growing corn. Figuring out the corn yield is a problem that is much more real than one in a textbook.

Club work stands for the best things for boys and girls educationally, morally and socially. It was designed to promote cooperation. Unfortunately, in some cases it has degenerated into a scramble for large cash prizes. Although it is not the province of the State Leader's office to make prize rules, that is a matter for the various communities and interested agencies, we do not hesitate to make suggestions.

To meet the criticism to which I have just referred, we advocate the organization of clubs of five as the competitive unit. Let there be local contests, if there be more than one club in a community; township contests among the winning local clubs, a county contest of winning township clubs, culminating in a congressional district or State contest.



The county farm adviser calls to see the boys' pigs.

This will necessitate team work upon the part of club members. If one is a shirker, the others will "cuff him up to a peak and knock the peak off."

And then we advocate the recognition of every club member who completes the job and hands in an acceptable report. Local authorities may secure for this purpose inexpensive achievement emblems bearing the National Boys' and Girls' Club device.

Although it is quite early in the club season we have an enrollment of seventeen counties of 297 members organized in thirty-six clubs. This is exclusive of the Cook County enrollment.

The young people on your program will demonstrate to you the "Worth-whileness" of club work more effectively than I can tell it. For fear, how-

ever, that they will be too modest, I want to call attention to a few things which I believe that club work stands for and seeks to develop in its members.

Promptness is a virtue we should all cultivate. The club member must be prompt in attending to his job, if he expects to be successful. In talking to club members I tell them that we hang out the sign: "Boys and girls with three hands need not apply." The third hand is the "little behind hand."

Sticking to the job is another characteristic of a good club member. Paul Walker, a Crawford County corn club boy, did not give up when his corn was under seven feet of water. He wrote that if he couldn't make a crop this year he would try it again, next.

Initiative is a characteristic that makes for success. When I sent out a letter to the corn club last summer and asked them to send in a statement of their per cent stand, I gave them directions to follow which applied to checked corn. Some of the boys who had drilled their corn could not supply the information, but Robert Wilson, of Macon County, who is on



An Indiana Corn Club Boy.

your program, took the time and trouble to work out a new method and I have carefully preserved the drawing he sent me at that time. He didn't give up because he couldn't work it by the "method in the book."

The possibilities of club work are infinite. The machinery is here and in working order and with the help of this organization and other agencies, we hope to help the Illinois boys and girls of to-day to prepare to fulfill their obligations as the rural men and women of to-morrow.

I thank you. [Applause.]

PRESIDENT TULLOCK. We will now hear, "What the Canning Club Has Done for Our Community," by Mrs. Morris. [Applause.]

WHAT THE CANNING CLUB HAS DONE FOR OUR COMMUNITY.

(Mrs. F. H. Morris.)

MR. CHAIRMAN, LADIES AND GENTLEMEN: I am not sure but what you will be rather disappointed in this report as it is simply a report of what two clubs have done since the 8th day of May last year. We can tell you what we have done. We have two clubs in our community, the Excelsior and the Pleasant View, which have a combined membership of sixty-five.

While some of our members look upon the canning of vegetables only as an experiment and there were others who could not can largely on account of small gardens, yet, we have made several good records. One of our club girls canned \$35 worth of vegetables. Another member canned \$44.70 worth. Our banner canner canned 724 quarts of produce, 29 varieties of vegetables, 13 varieties of fruit and a salad dressing. All but two of these varieties were grown on their own farm. She was not working for a record. Her vegetables were worth \$95.10. Our banner garden, however, was in the hands of two sisters-in-law and produced not only vegetables for two families but about \$106.80 worth of canned produce. They canned 160 quarts of fruit also.

Excelsior captain made a splendid record with her garden. One of our Pleasant View girls sent to the State University and secured the bulletin on the making of jelly and made 200 glasses of beautiful jelly, aside from her canning. We are learning how to use the Government bulletins. We have found out that we can get help from the Government just as easily as you men can.

Soon after the club was organized, we discovered that few of us were aware of the vast library of free information accessible through the use of the bulletins published by the State and United States Departments of Agriculture. In July each member of both of these clubs was presented with a bulletin on "The Preparation of Vegetables for the Table." These were received very gratefully and we have used bulletins ever since in our work. Eight different bulletins, 65 copies of each were used, which makes quite a little library of valuable information, which we have given to our community. These bulletins were secured for both clubs in one package. It has been the aim of the leaders of both of these clubs that when they find a good thing for their club they pass it on to the sister club. There is the greatest harmony between the two clubs and just enough competition to keep up the enthusiasm. We exchange plans of our work, but there is just a little bit of rivalry, just enough to keep us doing our best work.

Several of the members sent to the State for such bulletins as were of interest to them. A booklet on Cultural Directions, published by a prominent seed house, was also secured for our members. It is a condensed little booklet of very valuable information and just the right size to slip in our pockets when working in the garden.

All our summer meetings were held in the schoolhouses and blackboard work was prominent. The Excelsior Club was organized at the Austin Township school picnic, where three small clubs were organized, two near Warrensburg, and the Excelsior, with five members, nearer Maroa, on the 8th day of May. On the 8th day of June the Pleasant View Club was organized with 28 members at the Pleasant View schoolhouse, entirely by home forces. Eight of their members were transferred from the Excelsior Club. This shows you the spirit of our clubs.

The first two meetings for each of these clubs were almost identical. At the first meeting for each club, copies from the chart used at the Government canning school were placed upon the blackboard and explanations made by one of our members. The second meeting for each club was a demonstration—at Excelsior by the leader and at Pleasant View by the captain of the girls. A certain resolution made in the beginning of the club work at Excelsior and adhered to by the clubs has proven a benefit. It was this: That we would not call upon anyone higher up in this work for anything that we could do ourselves. That placed the responsibility right with

the club. We can not blame anyone else for something they have or have not said or done. We were new in this work. Neither one of our leaders had ever been a member of a club of any kind. We had to study these subjects. We found that there were so many things that we could do, and having no past experience by which to judge, we just simply did them as quickly as possible.

Our women are learning to work together. We are gaining a deeper insight into the importance of woman's work. Our boys and girls (for we have boys who are interested), find in this a tangible form of work. You can not blame them for not being interested in our work if they see no results from their labors. They are learning valuable lessons that will be practically of benefit in later years. Men are being interested also. It is not hard to interest men if you give them something good to eat. When a woman can produce \$50 worth of vegetables, the men get interested. They are interested in the saving as well as the eating.

A few weeks ago one of our men purchased for his wife an aluminum pressure canner costing almost \$20. Why? Because he considered it a good investment and a saving of her time and strength over the method she used this year. Several of our men help their wives to do this canning. One of our men canned 24 pints of greens one day when his wife was gone. Twenty-four pints of greens fresh from the garden occupy considerable more space than they do when in the cans.

We have several young canners, too young to go into the canning club, but who are planning to do so next year. Our youngest canner was four years old and she canned in a canner that was made by a nine-year-old boy. He had seen the larger canners made and he took a "Crisco" bucket and a circular piece of galvanized iron, a punch and a hammer, and punched holes through the iron and made three little legs for this tray to sit on. And his canner worked just as good as the twenty-dollar canner that one of our men purchased for his wife.

We had no contests last year because we did not have money to buy prizes, but we are going to have them this year. I will tell you how we got the money for the prizes. In the community where we live very little was known of this canning club work aside from where these clubs were working. Maroa is over six miles from the Excelsior schoolhouse and also five miles from Pleasant View schoolhouse where our clubs met for work. When the Maroa paper announced the names of the officers of the association for the Maroa Home Coming Celebration, the leaders of our canning club decided that there would be a good place to advertise the Mothers' and Daughters' Canning Club movement. They telephoned to some who might be interested and later the leader of the Excelsior Club called on several of the people and explained to them what we were doing. The association made us this promise; that if we would bring exhibits and give them three demonstrations they would furnish us all the room necessary. They afterwards found out that was a rather rash promise. Three days before the home-coming celebration they called us by telephone and wanted to know something about the arrangements for our exhibits, and so forth, and the number of our cans. They were going to fix a place to take care of about fifty cans. When we told them what we had, the committee rented a large tent for our exhibit and demonstrations. One of the teams that demonstrated was a team trained by our Pleasant View captain; she was a rather bashful girl, but very enthusiastic. She had never done any of this kind of work before, but she gave our first club demonstration and she has gone into eleven different homes demonstrating and explaining this club work. She trained the team that demonstrated the first day. The second day we had a team from the Excelsior Club which was led by their captain. The third day a team from both clubs demonstrated. There were people from Mt. Pulaski, Kenney, Heyworth, and other towns who came to our demonstration and wanted to know more about this work. The third day one of the ladies of the Maroa committee came to the leaders and said, "You can go down to Mt. Pulaski and do this same work there next week, if you wish. They want you to come and they said that arrangements can be made for

you to duplicate your work at the Mt. Pulaski fair next week." We leaders had been leaving our work at home and we didn't have any more help than we needed and when we were gone things did not go on at home. We felt we could not go, but it would have been a splendid chance to introduce the work into a new county.

The Maroa Association had promised a prize of \$10 for the best club exhibit and the offer was printed in big letters on the handbills they scattered for miles around, but there were only two contestants, Excelsior and Pleasant View Clubs. The Pleasant View won the prize with 111 cans of 43 varieties. Excelsior lost it with 68 cans of 37 varieties, just because they were outnumbered. There was no other difference. So highly was our work appreciated, however, that the Maroa Association voluntarily gave to the Excelsior Club an unpromised prize of \$5, as a token of their appreciation. The two prizes are the nucleus of the premium money we intended to use in our club this next year.

We also advertised our clubs and our work on the fourth day at Maroa by decorating two automobiles in club colors and riding in the parade. The Maroa business men confess that much of the success of the home-coming celebration was due to the work of our clubs. Visitors were interested in knowing how we canned these things and also interested in the new varieties.

From the very first we tried to encourage our members to try new varieties of vegetables and by first interesting them in our club we now interested the public at large.

Another thing we have found out in our club work is that if our local merchants don't handle what we want to buy, we can put our orders together and order elsewhere. We are not entirely dependent upon our little country town merchants. We can in glass entirely and there was a certain type of glass jar we could not get locally. We combined orders and secured 54 dozen from Chicago.

We have learned more of our county's resources. Just make this test for yourself. Take a seed catalog, pencil and paper, and note down the number of really good vegetables that can be grown in your community. Think of the different ways in which these vegetables can be prepared and decide for yourself if anybody can live better and cheaper than an Illinois farmer if his women folks are willing to can.

Our club work has been confined mostly to the members of the club. We have not had time to leave much of an impression, it seems to me, upon the community at large. We are just beginning. We are training workers. This is, perhaps, the most valuable part of our club work—the training of workers. None of us knew anything about this at the beginning.

There is another thing we realize and that is that our two clubs are two links in a chain that is rapidly being extended over our entire country. We want our links forged firm and true. We are doing all we can for the community and for the country at large.

We hear much talk just at present about preparedness. If war ever does come to our land—God grant it may not—but if it does, the canning clubs scattered over this country are going to play no little part in keeping want from our country. We women are learning to be better prepared in our own particular line of work. "To him that hath, it shall be given, and he shall have abundance; while to him that hath not, it shall be taken away. The better our preparation is, the less need we shall have for that preparation. I thank you. [Applause.]

PRESIDENT TULLOCK. "The Rural Teacher and Club Work for Boys and Girls," by Mr. B. W. Lovins. [Applause.]

THE RURAL TEACHER AND CLUB WORK FOR BOYS AND GIRLS.

(B. W. Lovins.)

MR. CHAIRMAN, LADIES AND GENTLEMEN: We will endeavor to make a brief outline of one rural teacher's views of boys' and girls' club work. Much is expected of the school teacher, and more of the rural school teacher than of the city teacher. Having many grades to teach, and much other

work to do aside from the prescribed course, the rural teacher must methodize his work to an exacting degree. Furthermore, he must use every means he can obtain to impress his work upon the mind of the pupil, or else, it, being so general, will not be definite enough.

Club work, therefore, used in connection with the ordinary school work, is the example for the rule. The boy is taught in the physiology class that carbonaceous food makes fat, and protein food makes muscle, and mineral foods make bone—yet he attaches no great importance to this fact, but continues to eat that which tastes best to him. But let him demonstrate the physiology lesson on a pig, and it will forever be a part of his mind.

The teacher must hold some definite height of attainment before his pupils if he expects them to do their best. Graduating from school is usually this point, but for children of the lower grades especially, it is far off and often lost from sight. And as a teacher, we would say that in the majority of cases of backwardness of pupils, it is because of their not having a definite goal in view. Lincoln doubtless had the presidential chair in view from boyhood, else he would not have attained it. Lincolns are the exception and not often met, but average children are the rule, and the average is the more important. Average children cannot see so far ahead, and the average boy does not aspire to the Presidency as is commonly thought, but desires to see some immediate result of his work, such as he can see in a growing pig, a perfect cedar chest, a dainty dress becomingly worn, or a row of cans filled with delicious fruits which bring summer sunshine on winter days.

These things are rewards which impress his mind as being just and sure, and teach him that labor is always justly rewarded, and if he works earnestly and honestly toward an honorable goal his labor will be as surely rewarded.

Children are lively beings whose bodies as well as minds must receive attention. Boys and girls are naturally interested in things common in life. The club associates them with things that turn their surplus energy into worthy channels. It teaches the value of exactness. The boy soon learns what a few bad grains of seed corn will do for his crop; or the girl the inevitable result of a bubble of air in a can of tomatoes.

A man once said to a teacher, "Why should my boy be a member of the Farm and Home Handicraft Club? He expects to be a doctor and he has spoiled ten feet of picture moulding trying to cut an exact corner for a picture frame." The teacher's reply was: "Had that boy better not learn to cut accurately in case of a picture frame than in a case of appendicitis?"

The club work has demonstrated to him, not only the reward for consistent, honest labor, but also the penalty for the lack of it. A boy does not care greatly about John Huss or Watt Tyler, but he becomes greatly interested in analyzing a neighbor's bunch of hogs, deciding for himself whether they are deficient or sufficient in the parts from which the expensive meat is cut, or why some hogs are worth more than others, even though they weigh the same and are apparently in the same condition.

Club work is profitable for other reasons. Children enjoy it, which alone makes it worth while; and it creates a love for nature and country life, where nature has a better chance to assert herself. The great movement of "Back to the soil" can never be accomplished to any great degree; the greater movement, "Keep the boys on the farm," can and is being accomplished. If the millions are to be fed, men must stay on the farm who enjoy farming, for a man whose heart is not in his work does his work poorly and it would not only prove unprofitable to him but would so impair the world's productiveness that disaster would result.

TO CREATE LOVE FOR COUNTRY THE PROBLEM OF THE HOUR.

Next to the parents, the teacher has the greatest influence upon the child's life. The teacher, to be of value as a rural teacher, must teach the things that will interest the child in rural life. I do not mean that he should teach that only, but should point out the advantages of farm life, prepare him for the farm life as far as possible, and create in him a love of farm life.

Many parents are enthusiasts on keeping the boy on the farm, yet they overlook the importance of the school. The public schools caused America to be free of her English yoke; the Pilgrims settled in America for liberty, which they did not find, nor had they courage nor strength to gain it; but they *did* establish a system of free schools. In three generations, this love of freedom and fearlessness had grown to such proportions that it could assert itself effectively. On the other hand, Ireland did not establish a system of free schools, nor has she yet her independence.

Therefore, we think more attention should be given to the schools by the parents. Is your teacher teaching your boy to love the country or the city life? The rural teacher realizes fully the import of the adage: "As the twig's bent, the tree's inclined," and most of them are inclining it toward a nobler, better, farm life, and those who are not are rapidly seeking other occupations through necessity.

Club work also removes the thought that physical labor is an inferior occupation. Many boys have looked forward to the time when they could sit in an office where only mental labor was performed; and being average boys, such mental labor as they were able to perform, caused them to be in a common class. While had their training been right, they would have known that labor is judged by its results, and as "Union is strength," undoubtedly combined mental and physical labor would have brought greater results.

For many years people have said, "Our common schools fit our children for no particular occupation." That is too true, but it seems that the schools have fulfilled the law. In a recent report of the Secretary of the Interior, we read that the schools are among the most backward institutions of the Middle West, being taught by teachers who know nothing but books. This too, is true, but has the law not placed a premium on such teachers?

The boys' and girls' club work is a great step toward a broader school system. As education is a process of comprehension which continues through life, we can only build a *foundation* for it in the common schools, and the life is usually shaped to fit the foundation. Club work is cement, so to speak, and the fundamental facts are the bricks.

To the teacher, therefore, falls the task of laying the foundation on which the lives of boys and girls are built. Let us build then, with care, for as Longfellow says:

"Else their lives be incomplete
Building in these walls of time,
Broken stairways where the feet
Stumble as they seek to climb."

I thank you. [Applause.]

CHAIRMAN MARLIN. Mr. Glen H. Gordon will tell us "How the Club Work Helped His Farm."

HOW THE CLUB HELPED MY FARMING.

(Glen H. Gordon.)

LADIES AND GENTLEMEN: I want to emphasize a little more about what Prof. Greene said about being in California. I attended one of the club meetings and I was surprised to see the interest that is shown there in this club work. Although they don't raise very much corn, they are very much interested in these clubs. I will first tell you how I became interested in this club work in Champaign County. In 1911, Hon. William B. McKinley, whom you all know, offered a prize trip to Washington, D. C. I thought the matter over when I learned about it and talked to my father and the county superintendent, Mr. Charles H. Watts. Mr. Watts organized the club in the county. He sent out cards of enrollment and these were filled out and sent in and you then became a member of this corn club.

Prof. O. H. Benson did a great deal to encourage the work I took up. He sent me information which was of great help to me. I raised my acre of corn that year and will not go into details and tell how I raised it, but I raised the corn and that fall Mr. Watts and Mr. Crest came out and meas-

ured this acre so that there were exactly 160 square rods in it, and I could get no more corn than what was supposed to be on this acre. The next day Mr. Crest came out and superintended the husking of it. It was weighed over the scales and found to be 100 bushels even. I thought I could get over 100 bushels from that. When the corn was taken to the University and tested for dryness, it was found that there were 107½ bushels, which sounded better to me.

I will tell you about some of the discouragements I had when raising corn. The little girl told about the discouragements in the canning club work. I had a good fence around my corn, but it did not answer the purpose of turning out the cows. My father and I built another fence. In about three days these cows were turned out into the pasture next to the corn-field, and almost every one broke through the fence and got into the prize corn acre. They wanted to get that prize corn. The turkeys went into it also, and you know what a turkey can do in corn.

I want to say that the interest taken in the canning club work is not very effective. We haven't had much canning work there. Mr. Greene and I will try to encourage that. I am rather strong for these girls' clubs myself. [Laughter.] The boys' corn club will be better from year to year, and since I have seen what you have in this county, I want to say that we are going to come up with you in another year. Mr. Wilson in your county has the prize trip to Washington and Mr. Smith in our county has it. He has raised only eighty bushels to the acre this year. I don't understand the reason for it as we have just as good land as you have and Mr. Wilson said he raised ninety-four bushels to the acre. We are going to show you in another year, with Mr. Greene as the leader of it, what we can do. You will hear from us. I thank you. [Applause.]

PRESIDENT TULLOCK. We will now adjourn until our meeting tomorrow morning at 9.00 o'clock. Adjournment.

THURSDAY MORNING SESSION.

HON. GEO. F. TULLOCK, *President*, Presiding.

Music—Selection.....Miss Cleo Rundle
Invocation.....Rev. T. Harley Marsh

PRESIDENT TULLOCK. Those of us who live in the northern end of the State have come more or less under the sphere of influence of the University of Wisconsin. A great and good work is being done up there in promoting all phases of agriculture and particularly in the promotion of a better understanding of leguminous crops. We have with us a gentleman who is largely responsible for a good deal of the good work done there and I am pleased to introduce to you Prof. R. A. Moore, Agronomist of the University of Wisconsin, who will talk to us on "Legumes." [Applause.]

LEGUMES.

(*Prof. R. A. Moore.*)

MR. CHAIRMAN, LADIES AND GENTLEMEN: I am certainly pleased to be with the good people of Decatur and surrounding country this morning. We have received so many good things from the University of Illinois that we feel we are duty bound to give some back for all the accommodations we have received from your great State. You have some men in your State who are as famous in our state as they are here. Although they work locally within your State, we have received as much benefit from the work of the men in your State as we have from some of the men in our own state. I am exceedingly pleased to bring you greetings from your sister state, Wisconsin, and to discuss this great subject given to me this morning. I felt that the subject of legumes was so broad that if I attempted to talk on all of the legumes that we would get scarcely nothing. I thought we would merely touch on some of the legumes coming into prominence at this time and devote my time to the great legume which is taking such a foothold in our state and which we worked so long and hard before we could get it growing. That legume is alfalfa.

SOY BEANS.

We are also doing a great work in our state with the soy bean. We tried out the cow pea and soy bean. We found that the cow peas were not adapted to our country. We have found through some sections of Wisconsin in the sand belt where it is low in nitrogen that it is an impossibility to grow some of the cereal crops on these soils. We have gotten the soy beans to do well and we have bred special varieties of soy beans that do well on what you might call almost pure sand. After we have forced large amounts of nitrogen into the soil, atmospheric nitrogen, by growing the soy bean, we get the soil so we can grow the red clovers upon it and as soon as we can do that, the battle is won. We can grow potatoes and corn on that land where it was impossible before we grew the soy beans.

I am not going into lengthy discussion on that subject, but if any of you are interested in the soy bean and you will drop me a postal card I will be pleased to send you a bulletin containing the whole story concerning soy beans which will give you an idea of all phases of the soy bean question. Later on in the discussion, if you desire, ask me questions concerning soy beans and I will be glad to go into the details. The soy bean takes the place of clovers in the sandy regions. We grow it for the seed, for hay, and also

put it into the silos. It makes a good ensilage when mixed with corn. If we grow them alone we put them in the silo at the rate of one load of soy beans and two loads of corn. Where the corn does not grow so high we can plant about half corn and half soy beans and harvest them for the silo together.

SWEET CLOVER.

Another leguminous crop which has gained considerable prominence in our state is the sweet clover. It has been growing wild there for a number of years. When the sweet clover started to come into our state our people rose up in arms as they thought it was a catastrophe that had fallen upon them and they rushed to the Legislature and passed a law placing sweet clover on the list of noxious weeds. The law passed and people were compelled to get out on the roads with scythes, grub hoes, etc., to cut down the sweet clover. They tried very hard to destroy it but the more they waged war against it the more the plant would come on and it has gone from the southern part of the state to the northern part of the state and wherever it has gone it has paved the way for the plant which is still better than the sweet clover—alfalfa. It has carried the proper germs necessary for the growth of alfalfa. It has taken possession of the roadsides in many parts of the state, but it has been instrumental in crowding out bad weeds along these roadsides. I like to see it in stone quarries and other ragged places because I realize the great work that plant is doing for our state. It has performed an important mission and after we woke up and found that the sweet clover was a true friend, they rushed back to the Legislature and had it taken off the list of obnoxious weeds. That leguminous plant is being tried out at the present time. I think there is a future for the sweet clover plant in our state. While I never thought very much of it as a profitable forage plant in past years, yet I have been so taken up with alfalfa that I have not paid as much attention to it as I should. We have been experimenting the past two years on this plant and I feel that it has a place in Wisconsin agriculture. I feel that under certain conditions we can grow that plant where we haven't the proper conditions for growing alfalfa. I think in many regions in our state where the lands are acid we can grow the sweet clover to a marked extent and I feel that wherever we are able to grow it for a certain length of time that it will perform the same purpose that the soy bean has done in the way of paving the way for another important crop. You are paying more attention to the sweet clover in Illinois than we are at the present time in Wisconsin. It is a crop that will command our attention during the next few years.

Those are two of our newer leguminous crops which we are now pushing vigorously. We have several breeds of soy beans adapted to the particular portion of the state in which we have them growing.

EARLY HISTORY OF WHEAT GROWING.

In my boyhood days the state of Wisconsin was growing wheat. Every farmer in our state grew wheat. That was true of my home county and in later years I found it was true of the other counties. We grew wheat until we had a first-class wheat mortgage on every other farm in the state. A man in speaking of the merits of his land would often say, "I have the best farm in this township; I have grown wheat for twenty-five years on the same land." Another fellow would reply that he had grown wheat for thirty years and that his land was for that reason better than the other fellow's. We did not know at that time that we were following improper practices and taking the bank account of the fertility of our farms and carrying it into the markets and that sooner or later the crash would come. And it did come.

It was through the efforts of an organized body that we stopped growing wheat. It was through the Wisconsin Dairymen's Association that we were called to account for our shortcomings. We were in a desperate condition, farms mortgaged, and we could only grow wheat at the rate of eight or ten bushels to the acre. It has been said that it was quite largely through

the influence of Prof. Henry and the chinch bug that we were stopped from growing wheat in Wisconsin. We don't know which was the most valuable in this work to the state, but between the two we stopped. We saw the condition that we were in and we listened to those men of the dairymen's association regarding this matter. They told us to turn before it was too late and to stop this ruinous process of continually growing wheat and then wheat. We were willing at that time to accept the advice of most anyone. They showed us the remedy—dairying. Nobody in those days thought of Wisconsin as a dairy state. Some farmers had as many as two cows and most of them had none. It was ridiculous to speak about dairying but we were willing to do most anything. The farms were sown to clover and mixed grasses where the Canada thistle and other weeds held sway in the wheat fields. The cows began to be brought in from all sides. It was a crime to kill a heifer calf in my county. Cheese factories went in at a rapid rate; from no factories to seventy-six in six years is the record of the cheese factories of my home county. They went into the dairy business and gave up the wheat industry almost entirely for something that was more rational, mixed farming or dairy farming.

THE ESTABLISHMENT OF THE WISCONSIN DAIRY SCHOOL.

The University performed a great part in this revolution in the farming industry. The Wisconsin Dairy School was established and it was the first dairy school in America. They had the great sum total of two students in attendance the first year and all the papers made sport of the Wisconsin Dairy School. They arranged for a second course in dairying and the next year seventy-eight young men showed up to receive instruction. The size of the school was only about 20 by 24 and seventy-eight students could not get in there and they divided them into six squads and a man had to wait a week before he could come into the dairy school for a single day. The Legislature was in session and the question was, "Are we going to turn down the farmer?" Already provision had been made for the lawyers and the professional men, but nothing had been done for the man who was the backbone of the country—the farmer. It was a question whether they were going to do anything for the farmer. There were seventy-eight men from the farm knocking at the door of the University for instruction. Prof. Henry requested \$45,000 to put up a respectable building. We could go to the Legislature for \$2,000,000 now and it would not shock them like the asking of \$45,000 did in 1890. They had never given much for agriculture in our state up to that time. After discussion and arguments were made by the various people interested they granted that appropriation and they put up our dairy school. It has been a monument to dairying. From 200 to 300 young men have been educated annually in the science and art of butter making and cheese making. You train a young man along a certain line of effort and he is going to have a desire to continue along that particular line of effort. If you teach him to be a railroad engineer, he will want to get on a locomotive and run it. If you teach him to be a doctor he wants to practice medicine. If you teach him to be a soldier he wants to go out and fight. I think our system of education far superior to that in Europe where people think they are obliged to go to finish their education.

The people of my state were poor 30 years ago. They were just getting over the one-crop system. These young men who came to the dairy school were poor and could not build factories, but they organized cooperative bodies until at the present time there are 3,185 cheese factories and creameries in the state of Wisconsin and dairy products are bringing in over one hundred million dollars a year. That has been largely done through a class of men that organized this great work and got the people of the state interested in dairying.

The state of Wisconsin alone produces about half of the cheese in the entire United States, so you will see that we are following dairying quite extensively. One-fifth of all the butter made in the United States is produced in Wisconsin.

You will say, "What has that got to do with the subject you are to talk about this morning, alfalfa?" It is the foundation. If it were not for our great dairy system we would not have so much need for that great forage plant. We found while our people were taking in one hundred million dollars for dairy products annually, they were sending out millions of dollars for high protein feeds. They were sending for cotton seed meal, oil meal and oil cake in order to balance their rations and feed their cattle in the proper way. It was the proper thing to do under the circumstances. They found they could get much greater returns from the feeds they were growing if they were mixed with the high protein feeds and they did exactly the proper thing. I would have no objection in continuing that way if it were not for the fact that it is so much easier instead of driving eight or ten miles to the railroad station and paying a high price for protein, when you could go into a big field of alfalfa and haul it into your barns and have a balanced ration and still keep some of these millions of dollars at home. That is the reason why we want our farmers to grow alfalfa. How was it in Wisconsin eighteen years ago? There were scarcely more than eighteen acres in the entire state. We were in need of that great forage plant. The people had tried it in various ways. A farmer would start in and try it on one part of his farm and then try it on another part of his farm and if he had a good deal of courage he might try it on a third place. If he stuck to it he would try it on the fourth and then give it up knowing it could not be done. He had tried it four different places and it could not be grown. The people in our state act slowly but when they do move they move rapidly and readily. In an early day we got the people in the clover habit. No matter what I say that alfalfa will do, I want you to think none the less of the red clover. The red clover has been the farmers' friend and it is to-day. I want you to grow red clover more widely than you ever have before, but still at the same time we have here an important crop that is coming in to take the place of some of these hays which you should not be growing at the present time. We are a red clover state and you people in Illinois should be encouraged in growing red clover more than you are at the present time. I hope you will widen your areas in red clover. It is a wonderful forage plant. The clovers have helped bring back millions of tons of nitrogen that had been previously taken from the wheat fields and sent on the market. I would not recognize a man as a *farmer* to-day if he was not a man who grew clover.

Clover has been the farmers' friend and it always will be. You have another friend in alfalfa that is coming to you that is even greater than the red clover and a member of the same family. When we started to work on alfalfa we knew considerable about growing clovers but very little about alfalfa. I wanted to go at the matter carefully. The first question was: If alfalfa is a great crop, how much greater is it than our great red clovers? How much greater is it than timothy? We started out on the station farm to run a regular test. I will not take up much time with figures. There are a few things that I want you to know before we take up this subject in full. I want you to know this chart. We carried on our tests with alfalfa, clover, timothy and brome grass. Everyone a few years ago was asked to produce the great brome grass. Our people all rushed to get some of this celebrated brome grass seed and they found that wherever the brome grass came up so would the dreaded quack grass which was due to the quack grass seed being mixed with the brome grass seed. I thought at one time that the whole state was going into brome grass.

We got four cuttings from the alfalfa. That is what you will always get if you watch the cutting stage, otherwise you will get only three. Four cuttings gave us 10,800 pounds of cured hay per acre. Let us see what we got from the timothy. We got only two and one-half tons of timothy from that one cutting. From brome grass we got 1.3 tons. From the clover we got two and one-half tons of hay. This is not so remarkable but there is something very remarkable on the chart that I will show you. We are growing large quantities of corn and coarse fodder but we need protein.

Here is the protein. With our alfalfa we got 1,996 pounds of protein per acre. With our clover which we have stated to be one of the best crops grown in the state, we got 661 pounds of protein from our acre plot. We had these different experiments in acre plots. They were not run in small plots. With our timothy that commands a higher price per ton on the market, we got 224 pounds of protein and with our celebrated brome grass we got 158 pounds of protein from an acre. We were able to grow as much protein with alfalfa on one acre as we could from three acres of clover and as we could from nine and a fraction acres of timothy. In our state we are growing 700,000 acres of timothy. What are you doing in Illinois? You are growing 1,400,000 acres of timothy in Illinois. You are going out and farming one-fourth of a forty of these high priced lands in order to get the same amount of protein you can get from a single acre of alfalfa. That is all wrong where land is worth \$250 an acre. With the brome grass we have to farm over twelve acres in order to get the protein that is possible with a single acre of alfalfa.

In looking over statistics I find you are doing the same thing down here that we are doing in Wisconsin. Do you think it is wise or had we better quit? Isn't our land getting so high priced that we cannot afford to take ten acres of it and farm it in order to get the same amount of protein feed that is possible to get from a single acre of alfalfa? I say our lands are too high for that. We have to grow crops where we can get returns on this \$200 and \$300 acre land. We can grow a crop that will do it. Alfalfa is a crop that you can realize on an investment on the land values of \$500 and \$600. Here is another thing. When you are growing timothy on your ten acres you are exhausting the soil. While you are growing the same amount of protein on one acre from your alfalfa that you are on the ten acres of timothy, you are adding constantly nitrogen to the soil and making the old soil better instead of worse. You have not drawn on the great bank account of nitrogen to the extent you did with your timothy, but you are constantly adding nitrogen to the soil and at the same time getting that wonderful amount of protein. You may say "How are you able to do that?" We have with us here one of the greatest plants known for taking the nitrogen out of the air. We have a great many of our states that are just spending one-half of what they can earn on the farm in order to buy fertilizer. It has been a good thing for the State of Illinois to have a man like Dr. Hopkins who has taught the people of this State better. We have states where the nitrogen has been lost and the farmers are getting it back by buying high-priced fertilizers. Nitrogen is worth fifteen cents a pound while phosphorus and potash are worth five cents a pound. In some states they are paying out millions of dollars for nitrogen when we have hundreds of millions of dollars worth of nitrogen all about us. If you stick your head out of the window you stick it in to eighty parts of nitrogen. Some of the farmers are sending off for nitrogenous fertilizers. Why don't we get some of this nitrogen from the air? We cannot go out and gather it up in large quantities and cannot take a machine and get it in a wholesale way from the air. The Lord has arranged that we get the nitrogen from the air in a roundabout way. It is not within the power of man to get it in a wholesale way because if it were, you would find a nitrogen trust formed before night and the nitrogen would be taken from the air to such an extent that it would be an impossibility to live. [Laughter.] The man who secures it can get it in large quantities by growing the great, beautiful plant that will be of so much value to him and will give him a ton of protein per acre to feed his stock. Protein is made from the nitrogen and because the plant is able to take nitrogen from the air is the reason why the plant can build up this great amount of protein. It goes to work and builds up a hay that is heavier in nitrogen than some of our best grain foods. Corn meal is an excellent food, but it has from ten to twelve per cent protein while alfalfa has about eighteen per cent.

The alfalfa takes the nitrogen from the air and draws freely upon that and builds up that great quantity of protein which the alfalfa is noted for. You can see how reasonable that is. After going through this old world for

about half a century I have given up the idea of thinking that the good things of life are two or three thousand miles away. It is the simple things that lie all about us that are the most valuable. It is the simple things in life that are the great things.

We have been able to accomplish great things in breeding grains and forage plants because we recognize the simple things that lie all about us. We have also given up the idea that in order to impress your audience you have to use language which the audience can only understand about one-half of what you say. The man who can express himself in the simplest words is the man who will carry with his remarks the greatest conviction. There are some people whom you never could get interested in the fertile lands around here, but if some man came in and talked about rubber stock away off in the Congo Free States, he would invest. We have men in our city investing their money in India rubber stock in Central America and investing their money in Mexico, but you could not get them to invest in good, substantial things. They listen to the will-o'-the-wisp two or three thousand miles away. We get over that as we grow older in life. Three years ago the great total acreage of alfalfa in Wisconsin was 18,000 acres and we had 700,000 acres of timothy, exhausting the soil and only 18,000 acres of alfalfa helping the soil.

I will say, however, that we have more than doubled in three years. We have about 35,000 acres this year and we want to double that by 1917. Your State and our state are especially in need of this great plant. I feel that we people should rise up in arms and start the work. There is no mystery about it any longer. I was asked a week ago in our farmers' institute in regard to this matter and the question was, "How many failures do you have?" I said that we put in 100 different pieces on the station farm last year and we don't expect to have any failures. We don't look for any and don't expect to have any as alfalfa is one of the most simple crops to seed. There are one or two things to know and if you will do these things well you will not have your crop frozen out in the winter which often happens to our clover. It is sure to catch and there is no doubt about it and we are taking no risk.

IMPORTANCE OF THE DEPTH OF ROOT GROWTH.

There is another thing about alfalfa. Alfalfa is one of the plants that is able to go down into the soil. A plant of alfalfa in a field I know of three years old is feeding twelve feet below. Some of the Western fellows say that in a particular place where they tunneled through a mountain they found alfalfa roots growing 127 feet below the plateau. [Laughter.] We do know that they run down 12 feet in three years. These roots were almost as large down twelve feet as they were up at the surface. We know they run down rapidly. I know in a field of alfalfa seven or eight years old that if it were possible to cut the roots twenty-five feet below and could turn those roots up into the air we would have a great forest of roots. That is something that will do your land good. If you can produce a veritable forest underneath your soil and these roots are bringing up fertility to the surface, you will have a sure cure for worn-out land. We have been farming for the past decade one foot of the surface. Right under that twelve inches we have another farm and under that another and under that twenty-five more farms and so on down. Let us get some crop that will go down and farm these farms and open up the soil and work up that soil and bring some of these elements up towards the surface and put our land in condition so we can grow two and three times the amount of crops, no matter what they are, upon the land that we did heretofore. Some have it all figured out. They say after 499 years we will have the soil exhausted of its nitrogen and all animal life necessarily will become extinct. If we will grow the crops that go down and feed on the 38th and 39th farms below, we can go on for several thousand years yet without exhausting our nitrogen.

If you all know just what could be accomplished we would have great alfalfa fields on every farm in the state. With these great roots going down

into the soil firmly, we have a mighty giant that has established itself there in a way that is not easy to uproot.

I was talking at a meeting recently when a man said, "Mr. Moore, if you get alfalfa into your soils you will not be able to get rid of it; you can't plow it out and now, if you take my advice, don't put any alfalfa on your land." I said that I would not want to get it out. I said that I would leave a recommendation in my will that it go down to my offspring and continue for hundreds of years because you will never get a crop in your land that will be worth as much money as alfalfa. When we kill our alfalfa we "kill the goose that lays the golden egg." We should keep our alfalfa. If you want to get rid of the alfalfa all you have to do is to sharpen your plow and cut these roots. If you attempt to go into an alfalfa field with a dull plow you will find it hard work. It is well to occasionally turn under a crop of alfalfa and run the field to other crops for a year or two.

There are a few things I am going to discuss. You undoubtedly feel that there is a great deal to this subject. We have reached that period where we know that it is a good crop. You all know it is a good crop. You know that you can get from one-half to two tons in a single cutting. You know it is possible for you to get from five to seven tons of alfalfa in a year of which about eighteen parts is protein and of that eighteen parts about twelve per cent is digestible. In alfalfa the protein is in such easy form that the animal has the power of taking it out and it goes to producing the great bone and muscle development. It goes towards the production of milk and of all feeds we haven't anything that equals it as a hog feed.

FEEDING HOGS ON ALFALFA HAY.

A man from the East went to work for man in western Kansas and was told to feed the pigs. He looked for the swill barrel and feed bins and not seeing any said, "I don't see any feed to feed the pigs." He was told to take a pitchfork and throw over some hay from a stack. He then said, "You may think I look green, but I am not green enough to think you can feed hay to hogs." Feed your hogs the way you would cattle and you will be surprised the way they take hold of these stems. Why not? There are eighteen parts protein in it. With high protein barley we only have fifteen per cent. Oats have about twelve per cent protein. You may say that hogs will hurt the pasture. They may hurt a few plants, but there is nothing in the world like alfalfa pasture. You are making more money from an acre of alfalfa pasture than you can make in any other way. Pasturing a field of any kind will hurt it. What if they do hurt it a little? It makes one of the greatest pastures in the world. For growing hogs it is the best kind of feed and puts up a great frame and the protein produces the muscle. You will be surprised at the great muscular development of hogs fed on alfalfa. You will be surprised at the great weights you will get by feeding alfalfa to the hogs.

I wish to state that I don't want all of you to put in one hundred acres of alfalfa at once. That is not my advice. I remember talking to an audience not long ago and one of the men was quite enthusiastic. Finally he got so enthusiastic he got up and said, "I am convinced, Mr. Moore, from what you told us that alfalfa is all right. When you say it is possible to cut \$100 worth of alfalfa hay from an acre, I believe it. You say it is equal to bran. We are paying \$24 a ton now for bran and you say alfalfa is worth ton for ton for feeding dairy cows and I believe it. Figuring this \$24 a ton you get about \$100 an acre." This fellow was converted and he said, "According to those figures ten acres will bring in \$1,000. I am going right home and put my whole 200 acres into alfalfa." I said, "I can only allow you to put in about one acre to start with." I told him that he would have to learn something about this highly organized plant.

IMPORTANCE OF INOCULATION.

You know it takes money to put alfalfa seed into the ground and have it put there right. I said all good farmers grow clover and wherever you grow clover put into the seeding from one to two quarts of alfalfa seed. Put it right in with your clover. Put it there to pave the way for growing

alfalfa. There is something that is absolutely necessary there. You have got to have the proper germs in the soil or your plant will not be able to feed on the great quantity of valuable nitrogen in the air. We have to have these germs in the soil; otherwise the plants soon die. It is the lack of inoculation that has killed out many fields of alfalfa. Any of you gentlemen who have the timothy habit, put three quarts of alfalfa seed in with your timothy and then you will be preparing that timothy field for a crop of protein. You will soon have your farm in such a condition that you can grow alfalfa anywhere upon it. We have certain ideal locations where alfalfa will do its best, but if we get the alfalfa habit it is but a short time before we will be growing alfalfa any place on the farm where we thought we never could grow it.

HOW TO GROW ALFALFA.

I am just going to give you a few pointers about alfalfa, as that is what the farmers want to know. He wants to know how to grow it. We don't care whether it feeds fifty feet below or twenty-five feet, but we want to know how to grow it. We want to know how to grow a crop of alfalfa in the most simple way. The energy of one man is just about 1/1,000 part of a drop in the bucket, so we need the energy of large numbers. We have what is known as the Wisconsin Experiment Association in our state. We have six thousand young men that we have trained in the College of Agriculture. Fifty of the counties in our state are organized as orders of this experiment association. There are about fifty of these organizations with about 4,000 members at the present time. We have the alfalfa order and we have 1,600 members in that order. They have the alfalfa habit. We buy our alfalfa seed in a body. In 1914 we sent out fifty-four tons of alfalfa seed for testing. That is quite a lot. There was over \$4,000 saved to the membership by buying that seed in a fifty-four ton lot. Those are some of the things that can be done by organization. If you can take the energy of 1,600 men and weld it into one man, the obstacles, no matter how great, have got to give way. We are thoroughly organized. We are throwing all that alfalfa energy upon one vital point. The experience I am giving you is not my own experience alone, but of two or three thousand people working in cooperation. I get out a bulletin from time to time showing the work that these people have done. When we want to decide something we don't let one or two men do it. I want two or three thousand men to do the same thing. If all the results are about the same way we are pretty sure of our work. We doubled the acreage of alfalfa in three years. We have twice as much growing now as we had three years ago. We figure that we have now about 35,000 acres of alfalfa and we need three times as much and we will get it.

There are a few definite things to learn in growing alfalfa and if we attend to them we won't make any mistake. If we were to select the most favorable soil conditions we will use a nice clay loam on top of limestone or gravel. You want to get well drained land. If you dig a posthole three feet deep in the morning and find it with six inches of water in at night, don't attempt to grow alfalfa there. The land should be drained. Take it on days like this or a little earlier in the year when the snow goes off, the water will settle in the little spots and there will be little places where it will freeze and wherever there is a plant of alfalfa under the little plate of ice, that freezes over it, that plant will be gone. A little flood water will kill alfalfa, smothers it entirely if on it for a single day. You must have plenty of drainage—good drainage. One of the greatest enemies of alfalfa are our common weeds, our fox tail or pigeon grass. It is remarkable how small the alfalfa is and then to grow into such a giant plant in the future. That little small infant of an alfalfa plant is choked out by the weeds. We have found if we want to put in alfalfa to stand the test for eight or ten years that we must be willing to sacrifice a crop for a year. If you can get land that will bring you a crop from \$100 an acre up, you can afford to sacrifice a crop for a single year. We will take a corn field and practice double the cultivation on that corn. That particular field has been in

clover the previous year and has been manured and we have turned down the manure and it has rotted. Then the next year we turn that up. That brings up a lot of this rotted humus and we have a perfect bed but there are some weeds in it. We set our disc running early and then use a fine tooth harrow; we then stop evaporation. That soil warms quickly after the evaporation is stopped and the weed seeds sprout. Then we go out with our fine tooth harrow and you will see many of these little white roots coming to the surface. That is the time to kill the weeds and we will go over it again and keep that up until the latter part of June or the 1st of July. Seeding should be done moderately early in the summer. Out of over 1,000 tests, those seeded August 15 did not survive the winter. Those fields that were seeded not later than the middle of July, all pulled through. You are farther south, but I think the 15th of August brings you up against the danger point. If we can get the land free of weeds we are able to sow on the 1st of June or July 1. The whole thing is to get the weeds down and sow your alfalfa seed alone. We have to sow twenty pounds of seed per acre when we sow for the first time. After a field has been in alfalfa for a few years we can get along with ten or twelve pounds.

Now, we found that by getting the crop established at that time that we were going to have a lasting crop. We are going to get a greater return hereafter by seeding in that way. We have given up almost entirely seeding with a nurse crop where we are putting alfalfa for the first time. If the conditions are right we can get our alfalfa seeded in June. We can get one good cutting of hay the first year we put it in if conditions are favorable. One good crop of hay is as good as most any crop you can grow on the farm. The main thing is to get the weeds killed. Get the weeds out!

There is just one thing more I wish to talk on, but I feel I have been punishing you and I am taking the time of the other speaker. I must speak of the cutting stage. We can get \$25 a year more of alfalfa by observing the cutting stage. Alfalfa is a peculiar plant. It is a perennial plant and will grow on indefinitely unless killed by accident of some kind. We have other plants that are biennials. You sow them one year and they produce their seeds the next year. After they have done that they die off and have run their life's race. With alfalfa we have a plant that goes on indefinitely. You will see the alfalfa will grow rapidly and come into the bud stage and then it hesitates and then is the time to cut. If you want to catch it in the proper stage you must cut it in a hurry. Just as soon as it blossoms the pollen falls and it starts making the seed. As soon as it does that, the plant has performed part of its function of life. You cut it and it lies dormant for two or three weeks, and finally it makes up its mind to start on. The best you can do is to get two or three cuttings a year. We had alfalfa in twenty days grow thirty inches. When it gets up in the bud stage we cut it again. It reacts with a vengeance. It comes the fourth time and we cut it. You can do that if you watch the cutting stage. We should not cut after the 10th of September.

I think I must close. I have brought here about two hundred of these little bulletins on the story of alfalfa and after the meeting if any of you want to come here to the platform your president will give you this little story. It is the experience of several thousand people who have been working on this great subject and I hope that we can change the alfalfa complexion of the State of Illinois and the state of Wisconsin so that the Government will have different figures in a few years. I am ashamed of these figures—18,000 acres in 1914 for the great state of Wisconsin. Just think of it! Seven hundred thousand acres of timothy in Wisconsin! Just think of that! The records give your State nearly one and a half million acres of clear timothy. They give us 700,000 acres of timothy and 18,000 acres of alfalfa. I know it takes nine acres of timothy to produce the same amount of protein that it is possible to get from one acre of alfalfa. We are not alive to our interests when you can grow alfalfa the way you can throughout Illinois and Wisconsin.

I wish to thank you ladies and gentlemen and I hope you will come and see us in Wisconsin and if there are any good things we are doing in Wisconsin that can help you, we are willing to give them to you because we have

received so much from your State and the grand men in your State. I thank you. [Applause.]

LIME AND LEGUMES.

(*E. E. Hoskins.*)

MR. CHAIRMAN, LADIES AND GENTLEMEN: There are legumes and legumes—so many, in fact, that one or more may easily and profitably be grown on every farm in Illinois, wide as are its soil and climatic variations and different as are the systems of farming practiced.

THE COW PEA.

The cow pea, being a warm weather and acid tolerant plant, is well suited to the southern section of the State, where the growing seasons are long and most of the soil extremely acid. Cow pea hay, when properly made, is unsurpassed in its feeding qualities and is especially good for dairy cows and for growing stock. In a rotation the cow pea should follow corn, and it leaves an excellent seed bed for winter wheat.

ALFALFA AND SWEET CLOVER.

Alfalfa may be grown on most of the soils of the State that have good drainage and that are not underlaid with a tight clay subsoil. Alfalfa is acid sensitive and a heavy feeder on the plant food element calcium. Sweet clover can be grown on any soil of the State where its plant food requirements are fully met. It is the one clover plant above all others that promises so much for the physical and chemical improvement of soils that have tight clay subsoils.

SOY BEANS.

The soy bean can be grown on any farm of the State, but care should be exercised in selecting a variety that will mature in the latitude for which it is intended. The soy bean is acid tolerant, though it does much better on land that is not acid. The soy bean is well adapted to short rotations and may well be substituted for at least a part of the oat crop on a corn belt rotation. To the hog feeder who wishes to produce on his farm rich protein feeds, the soy bean is especially recommended. In an Indiana hog feeding experiment, in which tankage and soy beans were compared as sources of protein food, it was shown that with tankage valued at \$50 a ton soy beans have a value of \$39 a ton. Land that will produce forty to fifty bushels of oats per acre should produce about one-half ton of soy beans per acre, or seventeen bushels. This, according to the experiment, would be worth \$19.50 per acre, or equivalent to fifty-seven bushels of oats per acre at thirty-four cents per bushel. Not only does the seed crop compare favorably with the oat crop, but the straw upon which seventeen bushels of soy beans are produced contains fifty-four pounds of nitrogen, forty pounds of which come from the air, and if returned to the soil is equivalent to the nitrogen in four tons of farm yard manure.

RED CLOVER.

Red clover has been and will likely remain the predominant legume crop for the corn belt farmer. It does not conflict with the growing corn crop as do cow peas and soy beans, is better suited for short rotation purposes than alfalfa, and produces a better quality of hay than its nearest competitor for short rotation purposes, sweet clover.

The profitable growing of legumes is becoming yearly more difficult. The Illinois State Board of Agriculture's report of December 1, 1915, shows that the amount of clover seed produced in Illinois has decreased fifty per cent during the last two decades. The nineteen years from 1877 to 1895 show an annual production of 108,123 bushels of clover seed, while the nineteen years from 1897 to 1915 shows an annual production of 53,115 bushels. There are two fundamental reasons why legumes growing is becoming more difficult. These are the increasing amounts of soil acids and the decreasing

amounts of two essential mineral elements of plant food, calcium and phosphorus.

The causes of soil acidity are many and imperfectly understood, and are of little interest to us in this connection, but the effects of soil acidity are far reaching.

ACIDITY AND BACTERIA.

It is a common observation that soils that produce little or no clover in dry season may produce good crops in wet seasons. Part of the soil acids are soluble and move upward and downward as the soil moisture moves upward and downward. During dry seasons the soil moisture moves upward and is evaporated from the surface soil, leaving the acid behind. Thus as the soil moisture becomes less the soil acid content becomes greater. Living upon the roots of legumes and in intimate relationship with them are the nitrogen gathering bacteria, which are very sensitive to acid. Not only are these bacteria sensitive to acid, but the roots upon which they live are even more sensitive. Thus it often happens that in dry seasons the soil acid may become so concentrated as not only to prevent the activities of the nitrogen gathering germs, but to destroy the root itself so that the entire plant may perish.

VALUE AND USES OF LIMESTONE.

Limestone has been used in the past primarily for the purpose of correcting soil acidity. Limestone when chemically pure contains forty per cent of the plant food element calcium, or it may contain both calcium and magnesium. In this connection it will be interesting to note the comparative amounts of some of the essential elements of plant food in leguminous and nonleguminous plants. A one-hundred-bushel corn crop contains twenty-three pounds of phosphorus and 150 pounds of nitrogen, while an equivalent clover crop of four tons contains twenty-two pounds of phosphorus and 167 pounds of nitrogen—the amounts of both of these elements being practically the same in both crops. The amounts of calcium used by these same crops are, however, essentially very different, the corn crop requiring but twenty-two pounds of calcium for one hundred bushels, while a four-ton clover crop requires 118 pounds, or more than five times as much as an equivalent corn crop. The amount of calcium that is required for a fifty-bushel corn crop will produce only a little more than one-third of a ton of clover hay. Limestone in the soil answers the double purpose of correcting soil acidity and of supplying an essential element of plant food.

Legumes derive their benefit directly from the use of limestone, while grain crops derive their benefit more indirectly and largely through the legume crops that precede the grain crops. Legumes may get their nitrogen from the air; nonlegumes must get their nitrogen from the organic content of the soil. Thus limestone enables the legume to get its nitrogen from the air, and this, when returned to the soil directly or as farm manure, becomes the nitrogen supply for nonlegumes. An experiment that has been conducted for a number of years at Cutler, Perry County, Illinois, illustrates this point admirably. Here a three-year rotation of corn, soy beans and wheat is practiced, organic matter being supplied on part of the field in farm manures: the amount of manure being in direct proportion to the crops grown. On other parts of the field the organic material is supplied in the crop residues and in catch crops. The principal catch crops were alsike and sweet clover seeded in the wheat to be plowed down the following year for corn. The effect of limestone on soy beans, wheat and corn by rotation is given in the following table:

LIMESTONE RESULTS ON CUTLER EXPERIMENT FIELD.*

WHEAT.			
Rotation years.	Yield without lime.	Yield with lime.	Percentage increase due to limestone.
1902-1904.....	12.1	13.3	9.9
1905-1907.....	16.2	22.6	39.6
1908-1910.....	9.2	15.5	68.5
1911-1913.....	4.9	11.1	126.6
CORN.			
1903-1905.....	26.8	30.7	14.5
1906-1908.....	25.5	31.6	23.8
1909-1911.....	26.6	38.6	45.1
1912-1914.....	15.5	24.0	54.8
SOY BEANS.			
1908-1910.....	9.5	11.4	20.0
1911-1912.....	6.1	9.7	59.1
TIMOTHY. (Odin, Ill., Farm.)			
Six-year average.....	.75	1.2	60.6

* All yields given in bushels per acre.

Limestone has been applied to the Cutler farm at the rate of two tons each rotation, and at an average cost of eighty-three cents per acre per year. As a twelve-year average limestone has increased the corn yield 7.6 bushels, wheat 5 bushels, and as a six-year average soy beans were increased 2.5 bushels. Valuing corn at forty cents per bushel, wheat at seventy cents per bushel and soy beans at one dollar per bushel, the average annual increase due to limestone is worth \$3.08. Deducting the cost of the limestone leaves an annual net increase of \$2.25, or at five per cent interest the value of the land is increased \$45 per acre by the use of limestone.

RESULTS ON WEST SALEM FARM.

Limestone applied at the rate of five tons per acre in 1912, on the West Salem, Edwards County, experiment farm, made very little gains during 1913 and 1914, due largely to very dry seasons, but mainly to the fact that the cumulative effect of legume growing had not become apparent. The 1915 crops on the West Salem farm gave some remarkably interesting results, though because of being for a single year, do not have the value of long continued experiments. As an average of two untreated plots the corn yield was 16.2 bushels per acre, while on a plot receiving limestone alone the yield was 22.4 bushels per acre, or an increase due to the direct effect of limestone of 6.2 bushels per acre. As an average of two plots where alsike clover had been seeded on wheat in 1914 and plowed down for corn in 1915, the yield was 33.6 bushels per acre, or an increase due to alsike clover of 11.2 bushels per acre. Thus the lime-legume treatment more than doubled the corn yield for this year. On an adjoining plot where 3,500 pounds of rock phosphate had been applied, in addition to the lime, the yield was 43.7 bushels per acre, or an increase of 10.1 bushels, due to a large growth of clover, which the rock phosphate was responsible for. Many legumes, of which alsike clover is one, have the power of using phosphorus that is contained in natural ground raw rock phosphate.

WITHOUT LIME SWEET CLOVER FAILS.

An interesting comparison at this point is that of the increased corn yield produced by alsike clover in one rotation and sweet clover in another at the West Salem farm. In the fall of 1913 sweet clover was seeded on a plot of ground that had previously a treatment of fifteen tons of manure, 2,500 pounds of rock phosphate and 1,000 pounds of kainit per acre, and on three-fourths of the plot limestone had been applied at the rate of five tons per acre. The sweet clover made a good growth in the fall of 1913 on the limed portion of the plot, but utterly failed on the unlimed portion. In June, 1914, the plot of land was plowed and planted to late potatoes. Being a very dry year, the potato crop was poor. Without additional soil treatment this plot

was planted to corn in 1915, and on the limed portion produced 63.9 bushels per acre, while on the unlimed part of the land the yield was 38.2 bushels, due to limestone and sweet clover. Limestone alone in the alsike rotation produced an increase of 6.2 bushels. Deducting this, we see that the sweet clover produced an increase of 19.5 bushels per acre.

BIG INCREASE DUE TO LIME.

On a similarly treated plot, except that the manure applied was in proportion to the previously grown crops, sweet clover was plowed down June 25, 1915, and the plot planted to late potatoes. The limed portion of the plot produced at the rate of 123 bushels per acre, while the unlimed portion produced 45 bushels per acre, or an increased potato yield of 78 bushels per acre due to the lime-sweet clover treatment.

ANOTHER FAILURE.

On another lot treated the same as the plot on which corn grew in 1915, alfalfa was seeded in April, 1914. Because of the very dry season no hay was made that year, but in 1915, 7,471 pounds per acre of good alfalfa hay were harvested on the limed portion of the plot, while on the unlimed portion of the plot 1,214 pounds of hay (mostly weeds) were harvested, and by the time of the last cutting the entire stand on the unlimed part of the field had died.

INCREASE DUE TO SWEET CLOVER.

On the Odin field we have a more direct and longer continued comparison between the effect of alsike and sweet clover on the yields of grain crops. As a ten-year average the corn in the alsike rotation produce 32.7 bushels per acre, while in the sweet clover rotation the yield was 41.4 bushels per acre, or an increase in favor of sweet clover amounting to 8.7 bushels per acre. As a nine-year average the sweet clover rotation produced nine bushels more wheat per acre than the alsike rotation. Limestone and phosphorus were used in both cases.

On the Carlenville, Macoupin County experiment farm, limestone was applied at the rate of four tons per acre in 1910. During the last four years the increase due to the use of limestone was, for clover one year, .49 ton per acre; soy beans three years, 2.1 bushels; for wheat 4.3 bushels; for corn, 7.3 bushels; and for oats, 1.3 bushels. Valuing corn at forty cents, oats at thirty cents, soy beans at \$1, wheat at seventy cents, and hay at \$6 per ton, the annual increase per acre is worth \$2.72. The limestone so far has cost \$1 per acre per year, but hereafter it will be applied at the rate of 1,000 pounds per acre per year.

RELATIVE EFFICIENCY OF MANURE.

At Pana, Christian County, alfalfa was seeded in the spring of 1914, but no crop was taken that year. In 1915 crops were cut, the following table showing the results:

Treatment.	Yield— tons.		Increase ton.
None (average of six plots).....	1.39	(Mostly grass).....	.....
Manure, 15 tons per acre.....	2.17	(Much grass) for manure.....	0.28
Limestone alone (five tons).....	3.41	For limestone.....	.52
Limestone and manure.....	3.46	For manure.....	.05
Limestone and rock phosphate.....	3.89	For phosphate.....	.48
Lime, phosphate and manure.....	3.71	For manure.....	.18
Phosphorus alone.....	2.63	For phosphate.....	.74

The most interesting part of these figures is that they show the relative inefficiency of manure, either alone or in combination with lime and lime and phosphorus. Fifteen tons of manure costing \$7.50 produced little more than one-fifth the increase produced by five tons of limestone costing \$6.25. It is also interesting to note that alfalfa has the power to utilize raw rock phosphate when used alone.

Doubtless those who live on the richer lands of the State may wonder what value, if any, these results have to their conditions. It should be kept in mind that if it is profitable to use limestone on poor lands to improve them, that it should be even more profitable on good lands that are beginning

to show limestone deficiency. In other words, it is more profitable to maintain the fertility of a soil than to allow it to become poor in order to use soil treatment more profitably.

MANURE EXPENSIVE AND INEFFICIENT FOR LEGUMES.

Let us pass now to the common brown silt loam soil of the corn belt. At Sidell, Edgar County, alfalfa was seeded in the fall of 1912. The following table shows the results of soil treatment for the past three years:

Treatment.	Yield in tons per acre.			Increase.			Three year average increase —tons.
	1913	1914	1915	1913	1914	1915	
None.....	1.17	3.14	3.65	.....	.....	.....	.....
Limestone.....	1.84	3.42	3.36	0.66	0.28	None	0.33
Lime and phosphate.....	3.06	3.85	4.07	1.23	.43	.71	.79
None.....	2.92	3.78	4.06	.....	.....	.....	.....
Manure, (15 tons).....	3.20	4.62	4.34	.28	.84	.28	.43
Manure and lime.....	3.78	4.20	4.17	.58	.42	.17	.19
Manure, lime and phosphate.....	4.20	4.49	4.13	.42	.29	None	.....

The most striking features of these results are that limestone and rock phosphate gave the largest increase the first year. It would seem that the alfalfa roots after the first year had been able to draw upon the supply of limestone in the subsoil sufficiently to meet its needs. The increase produced by limestone has been, however, more than enough to pay its annual cost. After the first year the alfalfa was able to get considerable of its phosphorus from the subsoil. However, it made liberal use of the phosphorus applied in rock phosphate. It is interesting also to note that the alfalfa made much more liberal use of the phosphorus when applied with manure.

The most clearly outstanding facts shown are that legumes do but poorly or fail entirely on land deficient in limestone; that they respond liberally to the use of phosphorus in raw rock phosphate; that the deep-rooted legumes are able to utilize the limestone and phosphorus in the subsoil, if these are present in sufficient quantities; that they are able to make use of phosphorus in raw rock phosphate, even when applied without the use of organic matter; and that manure is one of the most expensive and least efficient fertilizers for legumes.

GOOD RETURNS FOR HAULING LIME.

One of the most common objections urged against the use of limestone is not the first cost, but the time and labor required to haul from the car and spread on the land. When the roads are solid one man and a team should haul and spread two tons of limestone per acre on two acres a day when the distance is not over four miles. By referring to the Cutler data it will be remembered that limestone on that field produced an annual increase per acre of \$2.25. Now, if one man and team can haul enough for two acres to last three years, at the end of three years the increase will amount to \$13.50 for one day's labor for man and team. On farms that are deficient in limestone there are few farm operations that pay more handsomely. On farms, however, that are located eight to ten miles or more from a railroad station the objection to hauling limestone is a formidable one and here it is worth considering the use of burned lime. Burned lime, pound for pound, is worth practically twice as much as ground limestone in its power to correct soil acidity and to furnish calcium.

The objection to this is that burned lime may cause a needless waste of nitrogen through its destruction of organic matter in the soil.

It is worth while to remember that the experiments upon which these conclusions are based were incomplete, to say the least. No manure or other fertilizers were applied to these plats and the conjecture may be of some value that had manure been applied in proportion to the crops grown

and an abundant supply of the mineral elements of plant food provided, the nitrogen otherwise wasted would have been used in the production of larger crops and would, therefore, be returned to the land from which it came in the manures produced from the crops.

A DISPUTED QUESTION.

The fineness to which limestone should be ground for agricultural purposes is a disputed question. A recent bulletin issued by the Pennsylvania Experiment Station is authority for the statement that limestone coarser than one-sixtieth of an inch in diameter is practically worthless for agricultural purposes. The Illinois Experiment Station began a series of experiments at Newton, Jasper County, in 1912, the purpose of which was to determine the value of different finenesses of limestone. The results thus far obtained are not conclusive other than they do show that coarse limestone does produce beneficial results.

On one set of plots quarter-inch limestone with all the fine to one-tenth inch was removed. As an average of six plots in 1914 soy beans were increased by 1.5 bushels per acre. In 1915 the wheat crop, this coarse material, applied at the rate of 500 pounds per acre per year, produced an increase of 6.7 bushels per acre. Where 1,000 pounds per acre were used, the increase was 8.1 bushels and where 2,000 pounds per acre per year were used the increase was 8.5 bushels per acre. These results rather justify the use of quarter-inch material with all the fine left in.

Competent authority has shown that in humid regions about 800 pounds of limestone are leached from an acre of soil a year. To make good this loss it is necessary to apply two tons every four to five years and on soils that are extremely acid an initial application of three to five tons per acre is much better.

Limestone may be applied any time of the year and it is immaterial as to whether it is applied to plowed land or applied first and then plowed under.

At least one-fourth of the total cultivated farm lands of Illinois should be continuously in legumes, and these abundantly supplied with the mineral elements of plant food. Then, if the organic manures produced on the farms are returned to the lands from which they came the problems of soil fertility will be largely solved.

Legumes are the foundation crops for all ordinary systems of farming and if these fail, the nonlegumes must fail and farming can no longer be profitable.

I thank you. [Applause.]

PRESIDENT TULLOCK. We are going to have some more discussion on alfalfa by Mr. Cooper.

PAUL D. COOPER.

MR. CHAIRMAN, LADIES AND GENTLEMEN: If I should measure your interest in alfalfa by what I have just seen when so many of our number left, I should be compelled to believe that you have had just about enough of alfalfa. However, I shall not judge you that way, for I know it is growing late and the nearness to the noon hour has probably caused many of those who left to go. That so many have remained to hear this plant, alfalfa, further discussed, is to me quite a wonderful thing—a real tribute to alfalfa, and I may say that I believe it be worthy of all the interest and attention we can give to it.

We have just listened to two very able addresses by Dr. Moore of Wisconsin, and Mr. Hoskins of Illinois, two men well qualified to speak upon the scientific phases of alfalfa and its culture, and I am sure each of us gained much from them. Now, the best thing I can think of in further discussing this plant is for us to consider among ourselves something after the fashion of a round-table conversation, just what we think of alfalfa. So I shall first ask that those who have either experimented with the plant or are now growing it, to raise their hands. Well, it looks as though most of you have the "alfalfa bug" or now have it. So many hands denote

quite an interest. Now, let us have the hands of those who have tried alfalfa but who have discontinued growing it. Only one hand up speaks well. There were probably a hundred hands up as growers or experimenters and only one man who has stopped working with it. Let me ask that one man who raised his hand to the last question why he has stopped.

A VOICE. I have not stopped for good. I expect to sow some more in the spring. We did not get a stand, but will still keep after it.

Mr. COOPER. From the responses you have made to my inquiries, my conclusion is that almost all of you who have tried alfalfa have been pleased with the plant as a crop, for most of you have stated you are increasing your acreage. From the fact that only one man has stated that he has discontinued growing alfalfa, but expects to seed some more later, I am compelled to believe that all one needs to do to become a firm friend of it is to make a start, however small, and he will soon be an enthusiastic champion of the plant. And yet, after hearing these questions and seeing the responses, which are entirely favorable, only a couple of those in this gathering who have not formerly grown the crop signify their intention of making a start this coming season. Do you men who have not heretofore grown it and who do not expect to try a little of it the coming season refrain from starting because you are disappointed in the showing it has made in the hands of your friends? Do you expect to find a plant that will show better results than does alfalfa? Surely not. The truth is that we do better with any crop as we learn more about it, and even corn is no exception to this rule, for we know that as we have learned more about corn, we could have grown more and better corn if we had kept our ground up to its former standard.

For years and years we have been told that if we would try alfalfa we would grow from four to six tons of hay per acre and many of us have come to have the idea that if we do not get this sort of yield, the crop has been a failure with us. Believe me, my brother, we do not need to grow any such yields as this to make the crop pay us, and the truth of the matter is that we have no real reason to expect to jump into the growing of this crop and get the maximum yields. We do not hesitate to grow corn, and we seldom cease to grow it because we do not get the eighty to one hundred bushel yields we hear of others getting. Why ought we then, to expect to grow the maximum crop of alfalfa when we have had no experience with it? There is no reason under the heavens for our expecting to do so. It is not based on reason. As a matter of fact, with a number of years of experience with it, I have never yet grown what I considered a decent crop of alfalfa. I have never grown what I considered a decent growth of alfalfa, and if I were looking for some excuse for quitting, I have had it a number of times. I expect some of the others of you have had it and have not grown ideal alfalfa crops, but that does not deter you from going on. I saw a great many hands that were experimenting with it, when I asked, and some successful growers of it, too. Stay with it.

Do not be deterred from going ahead with it by the fact that perhaps you won't get the maximum results; keep with it. Here is Mr. Mann who is among our most successful alfalfa growers, and who, I believe, has worked with it more seasons than most of us, and yet, I believe he will tell you he is doing better now than he did a few years ago; that is, his crop has improved as he learned more of the plant. Why, then, expect to get a big yield right now? Why not expect it to improve later, as you do your other crops, when you have learned more of the crop? Why not expect to do something more with it when you know more about it? Is there any real reason why that is not the case? How many of you, after having listened to the discussion this morning, have come to the conclusion you would like to try alfalfa this spring?

I cannot help but believe, from the character and quality of the instructions we have had from Prof. Moore and Mr. Hoskins and the facts they have brought to our attention this morning, that if they spend their time and energy trying to convince us that great good is to come from alfalfa, that

we spend some of our time advantageously with it. I cannot help but think you should try it just out of curiosity, if nothing else. Do you expect something better out of alfalfa than has been told you? I have been trying to tell you that if you do just half as well as they told you your results should be, it will pay you. Let me tell you why it will pay you. In the first place, we have complacently and self-satisfiedly gone along on for a long period of years mining our land and looking down upon the poor coal miner who comes out from his work in the earth, with his black cap and his light; but by the way, he is as good as we are; he is only a different kind of a miner, on a different scale and taking a little different product from Old Mother Earth. We have been looking down upon him, but we too, have been mining; we have gotten our nitrogen content down until it is a limiting factor. For instance, in my case—and I am not so much behind the average—we have grown corn, corn, and yet more corn, and little else, depending upon a rotation of oats and wheat and such catches of clover as we could get—and these catches have been of ever increasing scarcity—to keep up our soil, and we have gone on this way until we have the humus about out of the earth, and this usually means nitrogen too, and of recent years we have found our ground works harder and harder each year.

There are two ways for us to remedy this condition of our soil. Two ways to get more humus and life into it so that it will work up better and our crops make a better start in it, and a more profitable finish. One way is to feed live stock, and thus convert most of our crops into manures to be returned to the soil, or to buy manure; and the other is to get the humus and nitrogen by growing leguminous crops. I do not expect ever again to be able to get all the manure I need to keep up the soil, but I can keep it up by growing the leguminous crops and adding phosphate, and this seems to me to be the easiest and cheapest way to do it. Alfalfa seems to be the best plant we have for use in this way. At least, it has been of the greatest aid to me in rebuilding a worn out prairie farm such as there are thousands of about us. I don't claim to know all about this, as I told you before, but I might tell you what a very intelligent farmer said down my way when he paid me a left-handed compliment; he said, "Cooper has a cracking good crop, but he ought to for he has mighty good ground." Yet, a few years ago this man and others said, "Cooper will never be a good farmer for he is a book farmer and his ground is all run down."

That is just what they will say about you: "He ought to grow good crops for he has mighty good ground"—if you grow alfalfa.

If I should go on and tell you all I want to about this, I would take as much time as the other gentlemen, and by that time you will become hungry, but I do wish to hold you just long enough to tell you that the expense does not need to keep you from growing the crop. Years ago it was a matter of conjecture as to what was the better way to do certain things and what operations would give the best results. We do not have to guess now. I don't need to experiment with the proposition. If I do what I am told I am sure of results. The thing to decide is to plant some. There are several ways of doing it. I have had good success in the last several years with alfalfa in corn as we laid it by, using this seeding only in such acreage of corn as we otherwise would seed to oats the next year. It takes oats out of the rotation. It has succeeded in the last two dry years and also the last year when it was wet. Some of the neighbors have done that and Mr. Veach looked me up at the hotel and said he had tried it this way and had found that it worked out with very satisfactory results for him. As I said before, it takes oats out of our rotation, but it puts alfalfa in the rotation and as Mr. Fulk, of Cerro Gordo, said when discussing this phase, "We can do without the oats when we have the alfalfa." I do not know what seeding this way will do in other localities, but I do know that it has been quite satisfactory to us. We have not yet failed to get a stand commensurate with the amount of seed used in the seeding. By that I mean when we used two or three pounds of alfalfa seed to the acre in a mixture of other clover seeds, we do not get a stand, but we do get a stand commensurate

with the seed we use. In dry years the alfalfa was the only thing that we could get a stand on commensurate with the seed we did use, and in our earlier experiments with this matter we found that we got as many plants from a couple of pounds of alfalfa seed to the acre as we did from eight pounds of clover used as the remainder of the seeding.

I do not wish you to get the idea that we believe this seeding of alfalfa in corn as we lay it by is the best way to grow alfalfa. Far from such being the case. We do believe that in some cases, as our own for example, a worn out soil can be quite quickly helped by handling in this way. The point I wish to get to you is that alfalfa is a good thing and that it can be handled in quite a foolhardy manner and yet get results for us. Of course, I believe it is best to know our soils, to supply that which our soils lack, and to give so good a plant as alfalfa every opportunity to give us good results, but you must remember that I had a worn-out soil, and I had to avail myself of any means of getting a leguminous crop to plow under. Clover had been a failure, but in this backwoods way of doing things, we have gotten a growth of alfalfa; about forty acres a year to plow under has been enough and it takes four horses on a sulky.

So I believe alfalfa is good enough to use in a short rotation, inasmuch as it seems to be so certain to catch with us and give us a crop to plow under or pasture, though if our ground is up to standard and we can allow the alfalfa to stand longer, I am certainly in favor of doing so, and of course we would and do then, handle the matter differently than I have just told you.

That our conditions are adverse, perhaps worse than your own, is shown by the fact that we are using about seven thousand pounds of limestone to the acre to sweeten the soil. We fall plow for seedings that are to be allowed to stand longer. We work the ground down early and keep working it until June. This kills our weeds and holds the moisture, both of which are a consideration any year, but more especially in a dry year. We inoculate by the glue method all seed, whether we seed in corn or in better prepared ground for a stand that is to remain longer. We believe either method of inoculation is all right and use the glue method only because it is more easily done and seems to do the business for us. The main point of all I am trying to tell you is—do not let anyone tell you that there is anything mysterious or anything that requires “hokus-pokus” efforts on your part to grow alfalfa. Just go out the same way as you would with clover and make a start. You noticed there was very, very small percentage of those men who had started that stopped trying to grow it and I believe they will be at it again. Do you think you could take a bunch of corn-growing men and break them into the grain game without any difficulty? It took the United States Government a number of years, after the boll weevil put a crimp in cotton in the South, to get the farmers to grow corn.

Don't let the fellows tell you because you have not got a good stand that you cannot get one; you can do it. If you want an ideal stand you must produce good conditions in your soil. If you want an ideal and a maximum return, you must have a sweet soil, a good soil. As I said, we are new in this just the same as some of the southern states are on corn. I do not know of any reason why I should take up more of your time. If you have any questions, let us have them and we will quit.

Q. How would it be to pasture sweet clover until about June first?

Mr. COOPER. I have not had any very extensive experience with sweet clover; only in a small way, and even then the highway commissioners told me to stop it or they would be after me, but I have since had one of those dearly beloved brothers after me to get sweet clover seed. I have not had enough experience with it to advise you.

A VOICE. We are very strong on sweet clover up in Livingston County, and we find out that you can pasture it up until the 20th of May or the 1st of June, using your judgment according to the season of the year, if early take the cattle off sooner, and if a later season leave them on.

In our county if we do not pasture it to May 1, it is impossible to handle with a common grain binder, it is too big. If you don't want to pasture it, mow it, mow it five or six inches high and leave some little branches and

leaves underneath. The best way is to pasture it up until the 1st of June, and then come and cut it in September. You can put an engine on the binder and cut it, but if you have not pastured it you would not be able to cut it with an engine, you would have another foot or two on top of it. Either way, pasture it or mow it.

Q. About how much seed does it make to an acre?

Mr. COOPER. This is one of the very worst years for seed. You must have a dry year for sweet clover as well as red clover to seed well. I did not cut mine at all because I did not think I was justified in cutting it for seed. One brother got one bushel and one a little more than one, and one got three, but we have records up in Will County of eight and nine bushels per acre, and on one five acre field of thirteen bushels per acre. I want to say right here positively, don't sow sweet clover unless you have lime in your soil, either in the surface or in the subsurface. If your plants live long enough to get to the subsurface, you get a stand of sweet clover, but it is just as essential to have the lime for sweet clover as for alfalfa.

Q. And inoculation, too?

Mr. COOPER. Positively inoculate all kinds of clover. We are daffy about inoculating in our county, and I don't think we are losing on it.

Q. How about the glue process?

Mr. COOPER. The glue process is the process we use. We sent to the government and got their inoculation culture as long as they would supply us, but now we are using the glue method.

Q. About how much glue do you put on?

Mr. COOPER. About a pint of dirt to the bushel of seed, using just enough glue water to make the seed slightly sticky, so the little particles of dirt will stick to the seeds. More dirt would do no harm, and many people use more, the only difference being that it would be necessary to open your seeder a little wider to get a given number of seeds on the ground.

Well, if that is all, we will quit now.

I thank you. [Applause.]

PRESIDENT TULLOCK. We will now hear the report of the Committee on Resolutions.

Mr. GREGORY, Chairman of Committee on Resolutions. The committee has a very short report to present and then we have a few joint resolutions to be presented by the State Farmers' Institute and the Macon County Farmers' Institute, which Mr. Walter Rowe will present as soon as these are disposed of.

WHEREAS, Agriculture has suffered a great loss during the past year in the death of Hon. A. P. Grout, Uncle Henry Wallace, Joseph E. Wing, and Col. Chas. F. Mills; therefore be it

Resolved, That we express our sincere appreciation of the unselfish work of these men for the advancement of agriculture.

Resolved, That we recommend the adoption, by the next General Assembly, November 7, of the pending amendment to the revenue article of the Illinois State Constitution, in order that the General Assembly may have the necessary authority to revise our Revenue Laws and adjust the present unequal burdens of taxation.

WHEREAS, It is important that some means be taken for the suppression of hog cholera and the prevention of the great annual losses therefrom; therefore be it

Resolved, That we are heartily in favor of the adoption of an organized plan for the study, prevention, and eradication of the disease.

WHEREAS, The shortage of railroad cars, due to the congestion at Eastern points has already caused severe losses to the farmers of Illinois; and

WHEREAS, No relief of the present acute condition is in sight unless drastic steps are taken by the Interstate Commerce Commission to force eastern railroads to return to the middle western railroads, cars belonging to them; and

WHEREAS, Hundreds of thousands of bushels of corn are in danger of spoiling in the next two months unless immediate relief is obtained; therefore be it

Resolved, That the Interstate Commerce Commission is hereby petitioned for immediate relief from this situation.

Mr. ABBOTT. I move that the resolutions be adopted as read.

The motion was seconded and unanimously adopted.

PRESIDENT TULLOCK. We will now have the reading of the joint resolutions by Mr. Rowe.

Mr. ROWE, Chairman of the Joint Resolutions Committee presented the following resolutions and moved their adoption:

**RESOLUTIONS OF THE MACON COUNTY FARMERS' INSTITUTE
ADOPTED THIS 24TH DAY OF FEBRUARY, 1916, AT DECATUR,
ILL.**

WHEREAS, The Illinois Farmers' Institute did accept the invitation tendered them by the Macon County Farmers' Institute and the Association of Commerce to hold their twenty-first annual meeting at Decatur, Ill.; and

WHEREAS, This meeting has been not only of very great educational value to this community, but has also given us an impetus toward a more progressive agriculture and a better country life; and

WHEREAS, In the preparations for the reception and entertainment of this great gathering it has been necessary to call for the assistance of various local organizations and individuals whose ready and willing response has been essential to its success—and to whom we are greatly indebted. It is fitting, therefore, that we express our appreciation and gratitude to all who have assisted us in this undertaking and especially to the following; therefore be it

Resolved, That the Macon County Farmers' Institute does hereby express its sincere thanks to the trustees of the First Methodist Church of Decatur, Ill., for the courtesy extended in permitting the use of their edifice which was so admirably adopted to our needs at this time for holding the general meeting of the Illinois Farmers' Institute—also the trustees of the First Presbyterian Church for the use of their building for holding the greatest "Better Baby Contest" ever held in this State, the success of which is largely due to the untiring efforts of Mrs. William Downey, president of the Woman's Club of Decatur, and the doctors, dentists and nurses who gave so freely of their time and services—also to the ministers and musicians who have assisted in these meetings—also to the board of education for the use of the high school auditorium for holding the domestic science sessions—also to Mrs. Mary Moore Eyman, county superintendent of schools, for her valuable service in preparing and arranging the splendid display of country school work exhibited at the Macon County Court House—also to Messrs. Bartlett & Martin for their courtesy in permitting the use of their building for displaying the Macon County farm products and the excellent exhibit of the Macon County Canning Club. We also wish to express our hearty thanks and appreciation of the valuable cooperation and assistance rendered by the Herald and Review and by the Association of Commerce of Decatur and by the business men of the city who contributed so liberally to the premium list—especially also do we thank Mr. H. A. Peverly, secretary of the county institute, who, in spite of serious illness in his home, devoted himself to the work of his office; be it further

Resolved, That we do hereby, in conjunction with the Illinois Farmers' Institute, most heartily indorse the pending amendment to the Illinois Constitution which seeks to secure a revision of the Revenue Laws of this State; and be it further

Resolved, That we do hereby most heartily endorse and offer a hearty cooperation to the movement to secure for Decatur a coliseum adequate for the needs of such meetings as this and others of an agricultural nature and urge that when such a building is constructed these needs be fully considered; and be it further

Resolved, That we are heartily in favor of the movement to secure a county agent for Macon County, as hundreds of other counties have proven the value of such a plan; and be it further

Resolved, That in the death of Henry Wallace, of Des Moines, Iowa, on February 22, 1916, all agricultural interests of this country, and especially the corn belt, has lost one of its greatest progressive forces, whose advice and teachings will be sadly missed. And we feel this loss in part our own and that our secretary be instructed to forward a copy of this resolution to his family and to extend to them our deepest and most sincere sympathy in their bereavement.

The resolutions were unanimously adopted.

PRESIDENT TULLOCK. I wish to announce that the prize-winning babies will be at the high school auditorium at 1.30 o'clock this afternoon, when awards will be made. The Macon County Farmers' Institute also asks you not to forget to visit the canning club exhibit at the B. & M. Garage, two blocks east of the transfer house. We will meet again at 1.30 o'clock this afternoon. We are now adjourned.

THURSDAY AFTERNOON SESSION.

1.30 o'Clock.

HON. E. W. BURROUGHS, Presiding.

Music Glee Club

Mr. BURROUGHS. I have the pleasure of introducing to you Mr. A. D. Gash who will address you on "Highway Improvement."

HIGHWAY IMPROVEMENT.

(A. D. Gash.)

MR. CHAIRMAN, LADIES AND GENTLEMEN: It is a pleasure to me to appear before this intelligent audience of farmers from all over the State of Illinois. We have just listened to and witnessed some beautiful music by these young ladies. As Keats says, "A thing of beauty is a joy forever, its loveliness increases, it will never pass into nothingness." So we say of good music.

Therefore, we, as children of one family, the human family, are seeking to improve ourselves in education of every kind. We are seeking to improve our homes, our factories and our farms. That is what you are gathered here for, to get better facilities for your farming and better means for taking care of all the lands throughout the length and breadth of this splendid commonwealth, of which each of you are so proud. We are seeking to improve everything that goes to the welfare of the men and women and children of this State. The people of this intelligent community, of which you are proud to be citizens, are seeking to cultivate your lands by the best methods and improve all your surroundings in every way.

Therefore, I apprehend it will be a pleasure to you to listen to me discuss the road question and see if I can offer you anything that is of material benefit to the people of this fair State in the way of bringing about better roads in the community. I want to preface this by telling you of a circumstance that happened at Buffalo, N. Y. Perhaps some of you have heard me tell it, but I want to speak of it, so that every citizen in the State of Illinois, before I get through it, has heard it, so that it may touch your civic pride as it touched mine.

A year ago last October, I attended a great good roads banquet at the city of Buffalo. There were men from all over the United States of America there. There were four or five hundred men at the tables. It was given at the Statler Hotel, at the close of a good roads conference. I was introduced as the first speaker at the banquet. After mentioning my name in introducing me, the toastmaster said, "This is the man from the State of bad roads." Now, I had heard this said throughout the length and breadth of Illinois. I had seen that we had bad roads. I had heard it stated many times that we were second among the sisterhood of states of America in point of collecting money and spending it on the public highways, yet we were twenty-third in point of improvement. I had seen it published in the press that this was the State of bad roads, but all of that occurred while I



was here at home. I had seen these lines published in the Illinois State Journal at Springfield, one of the splendid papers of this State:

"There's a blight upon your name, Illinois, Illinois; It has compromised your fame, Illinois, Illinois; In the spring and in the fall When we've lots of things to haul We can't use your roads at all Illinois, Illinois; We can't use your roads at all, Illinois.	"See them stretching on and on, Illinois, Illinois; Like a ditch across the lawn, Illinois, Illinois; Through your mud so black and thick That a four-in-hand would stick With a load of twenty brick, Illinois, Illinois; With a load of twenty brick, Illinois.
"When it comes to growing corn, Illinois, Illinois; You can laugh them all to scorn, Illinois, Illinois; But 'tis painful to relate That for highways out of date You're the banner holding State, Illinois, Illinois; You're the banner holding State, Illinois.	"You have been a little slack, Illinois, Illinois; Time to take another track, Illinois, Illinois; If you have a bit of pride Don't be any longer guyed; Make your mud roads hard and wide, Illinois, Illinois; Make your mud roads hard and wide, Illinois."

[Applause.]

I had seen all of these things and I had heard many other things spoken of the bad roads of our State. I knew well that Massachusetts had fifty-seven per cent of all of her highways built of stone; that thirty-nine per cent of the roads of the state of Indiana were stone roads; that 25,000 miles of the roads in Indiana were improved; that Wisconsin on the north of us had twenty per cent of all her roads stone roads; that Kentucky on the south had twenty per cent of her highways in a condition that they could be used all the year around; I knew that Illinois had less than ten per cent of her highways that could be considered improved in a degree to amount to anything. These things I knew, as I told you I had seen them in the public press and heard them from the lips of public men, but to be there, six hundred miles from home, and to be introduced as "the man coming from the State of bad roads," it was like some member of my family being talked about in an ill way. It touched my civic pride. I said, "Mr. Postmaster, you may introduce me as the man coming from the State of bad roads, but it is the only thing you can truthfully say bad about the State of Illinois, and by the grace of God and those dear people out there, if I come back to you in twenty years from to-night and you introduce me to an audience in this city or any other city in the land, you will introduce me as the man coming from the State with the best system of roads of any state in the United States of America." [Applause.]

I see evidence on every hand that that pledge or affirmation is going to be made good within the twenty years' time, because the people of the State of Illinois are beginning to study this great question of how best to improve our roads. This is the greatest question we have to-day to deal with. We are especially interested in the improvement of the roads from our own homes. The most important road on the face of the earth is the road that begins right at our dooryard. That to every man is the most important road. So far as you are concerned, you occupy the center of the universe. Wherever you may be, the center of the universe is there. Seek to make it the best spot in the universe. Likewise, if the road leading from your dooryard is the most important road in the world, seek to make that the best road in the world, if you can afford it. I am not a man to advocate any expense that we cannot afford, or to advocate that any citizen go beyond his means in anything. I never did it myself in business or in

pleasure. I always wanted a little bit more when the sun went down at night than when the sun arose in the morning, as long as I kept my health, because there comes a rainy day sometime when no man can work and he must live on those things laid up during the period when he could toil. Therefore, it behooves us never to deceive ourselves as to what we can afford in any avenue of life; not even in our homes should we go beyond our means.

It is important in the question of our public highways to determine what we can afford to build. We should build the best we can afford because they are of such vast importance. It will pay for itself if you can afford the price to get the best products in every line.

So with these premises, let me tell you what I want in talking to you. I want to enlighten you on this road question and to tell you something that will be beneficial for you and your friends. Let us illuminate our minds on this question of road building.

I can best illustrate it by telling you a story applicable to the situation. A great railroad running through the West had what is known as the "Overland Limited Train." We had a few grade crossings, public highways with railroads, in this country that are extremely dangerous. A few, not many. There should not be any. This is one of the improvements that ought to be made, so that we will have none that are dangerous. But we have some that vehicles approaching the highway cannot be seen by the trainmen, nor can the people on the highway see the trains on the railroad when they are approaching it from the wagon road. Now, it was on that kind of a crossing that this accident occurred that I am telling you about, on an extremely dark night. It was one of those nights we sometimes have that you cannot see your hand a foot before your eyes. That was the kind of a night it was. It was such a dangerous crossing that the railroad company was required to keep a guard at that particular place because of the hazard to people crossing the railroad. The guard on the night in question was a chocolate colored gentleman, when an accident occurred in which all the inmates of an automobile were killed.

The darkey was put on the witness stand, as a witness in favor of the railroad company when a great lawsuit was brought against it for carelessness. When he testified, the attorney asked him, "Were you on guard at the crossing on the night in question?" "Yes, yes; I was there all right." Did you see the automobile coming; did it have headlights?" "Yes; it had headlights. I saw it coming right down the road." "Did you see the train approaching and did it have a headlight?" "Yes, I saw the train coming and it had a bright headlight; it was just coming right down the railroad track." "And what did you do?" "I took my lantern and I flung it at the automobile and it came right on, and then I took my lantern and flung it at the train and it came right on. Then I flung it again at the automobile and still it came right on, and I flung it again at the railroad train and it came right on and then the collision occurred and everybody in the automobile was killed. I shut my eyes. I felt so sorry."

Well, it proved contributory negligence on the part of the people in the machine and won the case for the railroad company. The attorney for the railroad company was so pleased with Mose's evidence that he invited him down to his office, after the trial was over. He said, "Mose, you made the best witness I ever saw on the witness stand. You won this great case against the railroad company. You left nothing for me to say that was necessary for me to say. You made such a splendid witness." "Yes," the darkey said, "Master, I knowed I was makin' a good witness all de time I was testifyin'. I knowed if somethin' did not happen I would win dis great case for the railroad company, but all of the time I was testifyin' I was afraid somebody would ask me if dat lantern was lit." [Applause.]

My friends, upon this question of roads I want you to light your lanterns or intellects and reason for yourselves, study for yourselves this great question that is the most important to our citizens.

Two years ago last October I visited Detroit and went over the concrete roads that are built in Wayne County. They do not build any other type of

road in Wayne County except a concrete road. The Chicago Road running west at that time was the longest concrete road I had ever seen. It was one of those kind of days that it rained one hour, snowed the next and the sun shone the next; just the kind of a day that a vehicle would almost be mired out of sight on some of the roads in the State of Illinois. I interviewed five different farmers on that road. I want to give you the conversation with the last one. They all testified it was the best improvement that had ever come to that community. The last one I questioned as I did the rest, "How do you like the improvement on this road?" "Oh," he said, "this is the best improvement that ever came to this community. If this road was done away with I would move to town. I would not live in the country any longer." He further said, "I am a truck gardener. I live eight miles west of Detroit. Before this paved road was put down here I used to market my goods up at Detroit with a wagon." He says, "I would take my two horses and hitch them to the farm wagon and take my products and drive up to Detroit, market them, buy what few things I wanted, and then come back home. That would take me all day and sometimes far into the night to haul that product down to the market and market it on a day like this. My horses would be almost worn out and myself along with them when I got back home." "But," he says, "I have been up to Detroit to-day with the same load, and I am working one horse as you see to a light farm wagon, a one-horse wagon." And he says, "I took a load of products, the same amount in weight, this morning, went up to Detroit, marketed my goods, bought what things I wanted and you see I am driving home pleasantly. I will get home at half past twelve; this afternoon I can do something else or I can take another load of truck up to Detroit if I want to."

My friends, light your lanterns for a moment and reason that. What does that mean? It means the saving of the people's time. The saving of one-half of their time every day they use the public highways in this great State.

I went down to Albion last Thursday and I saw a striking illustration of this. We got off the railroad train at Browns. There was not a train on the Southern road at this particular time of the day, and we had to drive over to Albion, some four and one-half miles away. There were some other men, twenty-five or thirty, came from other parts of the country on the same train I came on, and they were going over to the meeting. There were not sufficient vehicles to take all of them over. Hon. Homer Tice, another gentleman and I got into this particular vehicle with another man that did the driving, making four of us. The owner of the rig got into another vehicle that was there and he drove it. In going the four miles we stopped six different times, a light vehicle with two strong horses, so they could rest. The twenty or twenty-five men started to walk and they beat us a mile and a half in getting over there. They walked on the railroad track of the Southern Railroad. It took us an hour and a half to drive over to Albion from Browns, four and a half miles. Then in the evening when we went back it took us another hour and a half to go back. With that kind of a vehicle it should not have taken over half an hour to have made the trip. When we came over to Albion we got to the edge of the town when we came to the paved street in the city. The horses even cheered up and picked up their ears of their own accord and started to trot. After having tugged through the mud for four miles and a half they knew the difference, any animal or being on earth knows the difference between good and bad roads. I would be ashamed of myself to charge any intelligent citizen of this or any other state in the United States of America with not being in favor of good roads, the best that we could get and the best we can afford. I would not insult his intelligence that way.

But what about that man's saving over there at Detroit? He saves one-half of his time. He saves one-half of his horseflesh. It took only one-half of the horseflesh to haul the ton of produce up to the market in half the time that it did before the road was paved.

When I made the proposition at Buffalo, I had in mind that if the people should determine upon a bond issue to build the roads,

it would take twenty years to retire the bonds. I had in mind that if we bonded to build the system of State aid roads under the Tice Law and taxed each farmer eight cents an acre each year for twenty years, we could build the entire State aid road system in Illinois over which 89½ per cent of the traffic of every kind goes. One-half of the money we collect from a township goes to keep up and maintain the main thoroughfares. I had the State aid system in mind when I made that statement at Buffalo. Fifteen per cent of all the highways of every kind in counties of first class, twenty per cent in counties of second class and twenty-five per cent of all highways in counties of the third class, Cook County being the only one of the third class, making the system of State aid roads sixteen thousand miles or a little more, reaching into every community in this great State of ours, along which thirty per cent of our rural people reside, and within one mile of which and along the system of roads, seventy-five per cent of all our people residing in the country will reside. No home will be further than four and one-half miles away from this system of roads. A system of roads, which, when it is once constructed will carry eighty-seven and one-half per cent of all the traffic, pleasure and business of every kind and nature in the State of Illinois, and further, every hour we use them, mark you, we will save one-half the people's time; therefore we will save the cost of these roads in the people's time that will be saved, in the State of Illinois; if we shall construct them of a quality that can be used every day in the year, 365 days. Now, it means a further saving. It means the saving of one-half of the horseflesh. The average life of a work horse is ten years on a farm; you know that. I was born and raised on a farm. I have done everything until I was eighteen years of age that a boy raised on the farm could possibly do, even to suckering tobacco. I tell you suckering tobacco is the hardest work mortal man ever has done on the face of the earth unless possibly it is the work that the men who work close to the fires in the steel mills do. Nothing harder. I have been accustomed to toil. I have earned my bread by the sweat of my brow. Why should we scorn our work or trade, we are all accustomed to work, especially those who are born, raised and live on a farm. We are not afraid of work.

The average life of a work horse, I say, is ten years on the farm. For twenty years' work it will take two horses to do that, ten years each, one following the other. You will have to feed them three years each to bring them up to working age, you will have to work them lightly the first year that you put them to work. So you feed your horses twenty-six years to get twenty years' work out of the two. Then you have the investment in the two horses twenty-six years to do the twenty years' work, everyone sees that. Again, it will take three sets of harness for that extra horse to do the work on poor roads that one horse will do on good roads. The average time for harness to last on the farm is seven years. Now, you feed these two horses twenty-six years to get twenty years' work out of them. Sell the two horses and put the money out at interest, don't buy these three sets of harness, but put that money out at interest; then sell the feed that you give to the two horses twenty-six years to get twenty years' work out of them; put all this money out at interest and the interest on it during twenty years in my opinion will pay the average farmer's share of the cost of the entire system of State aid roads. Take this thought with you. Take it home and study it and let your lanterns or intellects work on it, and see if you cannot see that it is true.

In the State of Illinois are thirty-four million acres of land devoted to farming. I heard the man speak about alfalfa here from this platform this afternoon. That is a profitable and reformatory crop. It will cost the farmer on that thirty-four million acres of land eight cents per acre for twenty years if we wish to build the entire system of State aid roads of concrete or brick. It will cost no more and no less. It costs something to get anything that is worth while. What will the whole system cost you? You want to know the whole lump sum. You want me to give facts and figures here that cannot be refuted by any individual in the State of Illinois

or on the face of the earth. That is the kind of facts you want here to-day because my subject deals with the cost of a system of highways we must all pay for by taxation. There are thirty-four million acres of land devoted to farming purposes. All other classes are going to assist as well as the farmer in paying for the construction of these roads. The railroads are going to assist; all the people living in the cities and villages are going to assist; the manufacturing and the great corporations are going to assist. After figuring it very carefully we find that these interests pay sixty per cent of the cost—none of which can be built inside of the city limits in any part of the State excepting Cook County. That was an amendment made by the last Legislature. The original bill did not provide that we could build in the villages of Cook or any other county. Under the amendment we are allowed to build through the villages of Cook County, but not in any other county of the State. We build to the city limits and no further can we go. We must build all of this State aid road system in the country, yet all of the cities and villages and great corporations not devoted to farming pay sixty per cent of the cost of the roads alongside of the farmers' places as I told you. Now, it will cost the lump sum, to build the entire system of State aid roads, \$180,000,000. The enormous sum of \$180,000,000. Did you ever stop to think how much one million dollars is? It is a wonderful amount of money. We can scarcely comprehend the amount unless we are one of those favored children of fortune who count their wherewith in multiples of millions. A million dollars is so great that if a man had been born twenty years before Christ was born and had gone to work on the day that Christ was born at two dollars a day, living on one dollar a day and saving a dollar a day and could have lived until he would have saved a million dollars he would not yet have but six hundred thousand dollars saved. It would take him twelve or fourteen hundred years yet to have a million dollars. So, that is a fair illustration to your mind of what an enormous amount a million dollars is. Then to say, "Mr. Gash, do you think the State of Illinois can afford to spend the enormous sum of \$180,000,000 to build its State aid system of highways. I cannot afford to do it. I cannot afford to pay it." That is true if it fell on you or myself or on this audience; it would be extremely hard for us to pay, but when it falls on 6,154,000 people it becomes an easy proposition as soon as we calculate the numbers who are to assist in paying for it. At once, it will cost less than thirty dollars per capita to build this system of roads, of a quality that can be used every day in the year, build these roads so that the State will take them over and maintain them for all time at its expense. We are collecting a million dollars a year from the automobile license fund. This two million dollars appropriated by the last Legislature was not taken in direct taxes from you, every dollar came from the automobile fund, not a dollar from any other source. Eight hundred thousand of the eleven hundred thousand dollars appropriated two years ago was from the automobile license fund, so that up to date under this State Aid Road Law, there has only been \$300,000 paid from the general taxes of the State of Illinois. All of the rest has come from the automobile fund, and for the next year and a half the two million dollars that is available for building State aid roads comes from the automobile license fund.

Now, if we take it another way it will cost less than thirty dollars for each man, woman and child to build this entire system of State aid roads. Some have no means; the rest would not pay any if levied as a tax. Some have much means. They would pay a whole lot more than thirty dollars for each man, woman and child, but if laid at the per capita rate it would be less than thirty dollars, as you see at once, to build the entire system costing \$180,000,000. The farmers' part would be \$54,000,000. That is the darkest side. Thirty million dollars we figure will come from the automobile license fund. That will reduce it to \$150,000,000. Eight cents per acre per year levied on the acreage of the State of Illinois would pay the farmers' part of the entire cost. Eight cents per acre collected for twenty

years makes \$1.60 per acre. I affirm without fear of successful contradiction that there is not an acre of land in the State of Illinois that would not be worth more than \$1.60 an acre because of that improvement if we shall make it. There may be some acres down next to the river; Stoney Point, you might say would not be worth that much more, but if you broke them and sowed them to alfalfa or pasture, those acres would be worth more than the \$1.60 per acre because of the improvement. Many acres throughout the State of Illinois will be worth from fifty to one hundred dollars an acre more because of the improvement if you build the highways. So, from an economical standpoint alone, we can't afford not to build this system of roads.

The road down at Albion that I spoke to you about reminded me of an inspector that went to a school in the State of Illinois, one of our country schools. The inspector, of course, wanted to ask the children a number of questions and he did. The children answered them the best they could. They were all sensible, good questions. He was loaded with a fund of good questions. After he had asked the children many questions he said, "I will now let you children ask me some questions; just ask me any questions you want to and I will answer them." A number of the children asked him questions and he answered them right off the reel. Finally little Johnny sitting back among the children said, "Inspector, can I ask you any question I want to?" And he said, "Yes, Johnny, ask any question you like and I will answer it if I can, and I generally can answer the questions." Little Johnny said, "Suppose you were in a mudhole up to your neck in one of the roads of our State of Illinois, and a man would throw a brick at your head, would you duck your head or not?" [Laughter.]

Individuals who would say they were not in favor of good roads in Illinois or any other part of our fair land, we would feel like asking them a question of that kind, but, inasmuch as there are none but who are in favor of good roads, such questions are not required. We all know that good roads would be a particular advantage to all of us and we would like to have the best we can afford. We are not going to build anything we cannot afford. When it comes to touching a man's pocketbook, reaching down into it by taxation or by any other means, we are all from Missouri and we say on that point "You will have to show us that it will be to our benefit."

It has been said that the people of the State of Illinois are behind in good roads building and it has further been said that the people of the United States of America are behind in the question of good road building. But I say we have been the greatest good road builder in the history of the world. You can not go back into history far enough to find the first good roads booster. A thousand years before the days of Abraham, Babylon and Nineveh and the other cities and villages of the valley of the Euphrates were joined by stone roads. When the children of Israel came out of bondage they went as far as the Isthmus of Suez over a stone road. They could have gone on over the biblical road which was built from Sodom to Tyre had not the Phenitians objected to such a rabel going through their country. Darius built a 1,700-mile road of stone from Sardus to Sousa over which the first mail service in the history of the human family was established. The Romans built 50,000 miles of stone roads, some of the best stone roads ever built in the history of the world.

Most every speaker you hear talking on this subject will speak of the Appian Way, that splendid road built three feet in thickness, the last layer being nine inches in thickness of the hardest stone they could find. And the Appian Way was but one of seven great roads leading into every corner of the then known world. The road running from Jerusalem across the country into Europe was 4,080 miles in length.

I told the story of these great ancient roads at a good roads banquet in the city of Chicago a little over a year ago, and Mr. Baer from Belleville, who was one of the speakers who followed me, said he was very much pleased with Mr. Gash's statements about the ancient roads, but he said,

"Mr. Gash could have gone farther back into history than he did and mention other roads which he apparently overlooked, because we are creditably informed that the road to Hell is paved with good intentions."

Some people say we have been paving our highways in the State of Illinois with good intentions in the past, but we are not going to pave them with good intentions in the future. We are going to pave them with the best quality of materials we can afford. Mr. Baer further said, "We are creditably informed that the streets of Heaven are paved with gold." We cannot afford to pave our streets and roads with gold, but we can afford to pave them with stone and brick.

When we went down to the city of La Salle in La Salle County to dedicate the first mile of concrete road two and a half years ago, reaching from the city of La Salle across the Illinois River bottoms, they had a big barbecue and a gentleman was there that said he was born and raised in La Salle Township. He said, "I am fifty-two years old, and I verily believe that I have seen enough work done on the roads of this township to have paved them with gold." I think perhaps he put it a little strong, but I was born and raised in Easley Township, Macon County, Mo. I was fifty-five years old last Friday and I verily believe that I have seen enough work done on the roads in that township that if the work had been properly directed, paving a small amount each year, to have paved every mile of roads in that township with the best quality of brick, of monolithic construction, eighteen feet in width. Let me tell you something. Did you ever stop to think of the Herculean task our forefathers undertook when they came into this country known as the State of Illinois? It was nothing but a wild, wild woods, with great rivers gently flowing towards and meeting in the Mississippi. There was not a culvert nor a road of any kind except what the wild beasts and wild men made through the forest, simply paths. They had to swim the river, ford them, or build rafts that they made of rude construction or ford them on horses. They had to fight the wild beasts and the Indians, yet they did not hesitate at the Herculean task of their undertaking, in bringing this country to the state of civilization we have to-day. No; they knew it would cost them much energy, time and many hardships, many sleepless nights, and that they would be shaking with the ague in the spring and in the fall, but they nevertheless buckled on the armor of bravery, for they had to fight the wild beasts and the aborigines; and they further buckled on the harness of industry and went out to subdue the soil and build factories and railroads.

This is a wonderful story. We have more good miles of railroad in the State of Illinois than any other state in the United States of America. When we began to build the railroads in this State the then Governor said, "We cannot afford to build any considerable number of miles of that quality of road. It is of short duration. The people cannot afford it." But you have afforded it and have made them pay dividends on the watered as well as the legitimate stock by the patronage of people. It has been a paying investment. The State of Illinois has no more paying investment, nor the United States of America has no more paying investment than the railroads of the Nation, although the masses of the people don't own them, though they do own these public highways. But it is in the line of railroad building that I meant what I say that we had excelled the world in road building in the United States of America. We have excelled in that. The United States of America has five times as many miles of railroads as any one country in the world and almost as many miles of railroads as the rest of the world combined. They are beneficial beyond calculation. We first take the products of our soil to the depot, then to the various markets at home, or in our country, and then we send the surplus to the seaboard, put it on the ships and ship it to the outside markets of the world. When they started to build these railroads they had to build a few miles at a time. You see the public highway is the greatest of all public utilities; it belongs to the people and the people ought to be as conscientious in making them good as they are to make the private corporations, the railroads, good. I believe the people are determined to go to the limit of their means on

this question and get the best they can afford, because they will pay from every standpoint of the human race. They will pay from a social standpoint, we have seen where it pays from an economical standpoint. It will remove the high schools, so to speak, to the boys and girls living on the farm. The perpetuity of this splendid country of which we are so proud depends on the intelligence of its citizens. We all believe in the public school system, the high school system, and the common school system. Anything that places the high school so that the boys and the girls on the farm can get a high school education and remain at home with their fathers and their mothers while getting their education, you are in favor of, I apprehend. It will remove the high school so that the boys and girls on the farm can get their high school education as well as their common school education and remain with father and mother around their own fireside at night. It saves the boys and girls from going away from home to get their high school education. The history of this girl at Chicago a week or two ago tells the story. It shows that when boys or girls in getting their education are spending their time away from home, away from father and mother, there are snares set for their innocent footsteps. It seems no human being would set a snare to destroy a boy or girl in this "land of the free and home of the brave," but it is often done and we know it. These are the things that cause them to fall from the high standard that their father and mother set for them. If they spent their evenings around their own fireside while getting their education, it oftentimes perhaps would never have happened. I say that if one boy or one girl is saved from falling from the high standard their father or mother sets for them it is worth \$180,000,000 that it will cost to build this system of roads. [Applause.]

Would you spend money for the benefit of these dear girls that came here on the stand this afternoon and sang so beautifully for us? I say the honor of one of those girls is worth all of the gold on earth. I am sure that their parents will say likewise. I have four children myself, three boys and one girl. Not for all of the gold between the seas or in the universe would I have them fall from the standard of virtue and honor that I have set for them. I hope to set a good example for them in talking this good roads question and in building the highways. Not a dollar of graft will ever go into the hands of any man in the State of Illinois while we are building this system of roads under the present State Highway Commission. We may not get many miles of pavement each year, but every dollar that is taken from you for State aid road work will go into the roads. There was one contractor in the State of Illinois in Dupage County who sought to skimp the specifications, but the work was not accepted and the bondsman was called on to finish the work according to the plans and specifications. That was the Chicago Bonding Company. It came to the front and performed its duty well and the road to-day is built according to the specifications. It was delayed and the people in that community were tired waiting for it to be completed. It made them sick, sore and tired to wait, but they waited and the day after it was completed, as the plans and specifications called for, they celebrated and forgot the extra time they were cheated out of the use of the road. They said, "This thing has to be done right."

I wish I could talk to you long enough and show you every phase of this question. There is another side of it, the social side, the side of loneliness that comes to the dear wives on the farm, when the children are away at school and father is away at work. This one thing has dethroned more farm wives of their reason and sent them to the insane asylum than any other thing. If one farm wife can be saved from that awful condition for her children and her husband, it is worth the \$180,000,000 that we will spend for a system of highways that can be used 365 days in the year. That is the quality of road I am talking about.

In Illinois under the State Aid Road Law, if the best type of roads are constructed, the State will have the upkeep of the roads for all time. We

want all of our roads as good as we can make them. We want them well drained. The law prescribes a system for working all of the roads in the State of Illinois, and they are going to be worked to a system in the future. I have got to make a train, but I just want to illustrate the way the road movement is moving among the people before I leave, and bid you good-bye. It is moving with the rapidity of the darkey at Cincinnati. He was put one the witness stand to testify as to a shooting scrape. He was asked if he heard the shooting and he said, "Yes, I heard it, all right." "How many shots were fired?" "There were just two shots fired." "How far were they apart? Illustrate it." The darkey illustrated by clapping his hands rapidly, saying "About like that." (Indicating.) "Where were you when the first shot was fired?" "I was in the basement of the hotel shining a man's shoes." "Where were you when the second shot was fired," "I was passing the Big Four depot four blocks away." [Laughter.]

Four years ago the people did not want to hear much about this question. It is now moving with the rapidity of the darkey among them to-day. Everybody wants to hear about it. The more they hear about it and the more they think about it, the more they determine that they can afford better roads. The more good roads they get the better they are going to like them. There are no "ifs" or "ands" about this. Like the rolling snowball, little at first, but it grows larger and larger and then after a while it gets to the point where when you start it down the slide nothing can stop it. Just so with this great question. It is moving with the rapidity of the darkey. When you get it down in your system and believe it will be good for you, from every standpoint of human reasoning, and that it will be good for the people who will use them now and also good for all future generations, you become enthusiastic on the question. Section 31 of the law says that the State will take them over and forever keep them up if once constructed right.

Its movement is like the second darkey who was put on the witness stand in another shooting scrape. He was asked the question, "Did you hear the shooting?" "Yes, boss." "How many shots were fired?" "There was just one shot fired." "And you heard it?" "Yes, boss; I heard it twice." The Judge asked him, "How was that? You say only one shot was fired and you heard it twice?" "Your Honor, please, it was like this, I heard it when it passed me and then I heard it when I passed it."

So when we get it into our system to the extent that we believe that it will be good for us and good for our children and our children's children, it moves with that rapidity in our minds and consciences. Something is going to come of this afternoon's talk. You are going to discuss it and figure it from every economic and social standpoint and it is right that you should.

Little by little our public thoroughfares will be improved like the railroads. They did not all come at once, nor can you get all of these miles of highway improved at the same time; but little by little, like the dripping of the water that wears the rock, improved highways will finally come, like the railroads, all over the United States. We will finally have this State aid road system of over thousands of miles leading within four and one-half miles of every home in the State of Illinois, along which thirty per cent of the people of Illinois live, and forty-five per cent more of the people of Illinois live within one mile of it, properly paved.

First, because we have got to build them from a business standpoint. Second, we cannot afford not to build this system of roads from an economic standpoint and for the advancement of the education of our boys and girls in the country, thus bringing the places of pleasure closer to the people on the farm, and from every other standpoint we cannot afford not to build this system of roads and by the grace of God, the people, and the honor of this State, we are going to build this system of roads, in my opinion, as sure as the sun rises to-morrow.

I thank you, ladies and gentlemen, and bid you all good-bye. [Applause.]

CHAIRMAN BURROUGHS. We will next have an address by Mr. B. H. Piepmeyer, maintenance engineer of the Illinois Highway Department, on "Earth and Oiled Roads."

EARTH AND OIL ROADS.

(B. H. Piepmeyer.)

MR. PRESIDENT, LADIES AND GENTLEMEN: I am very glad that the officers of the State Farmers' Institute saw fit, in the preparation of this program, to confine me to one phase of earth road construction and maintenance. The intelligent use of funds in the construction and maintenance of approximately 90,000 miles of earth roads in Illinois is one of the greatest problems before the road builders of this State to-day. It is evident in a great many localities that the existing earth roads can be improved one hundred per cent if they were properly graded, drained and maintained. The maintenance of earth roads can best be handled by a careful study of means and methods of properly draining them. The natural and most effective method of accomplishing this is to first grade them up so that surface water and underground water will get away. The next step would be to treat the earth road surface in such a way as to make it impervious to water. This may be practically accomplished in several ways. The first and most practical is the systematic dragging of the earth surface, keeping it perfectly smooth the greater portion of the year. The second would be to apply an oil that would aid the road drag in keeping the surface smooth, free from dust and impervious to water. This last method has received considerable attention this last year, so my remarks will be confined to the subject.

SURFACE OILING OF EARTH ROADS.

The oiling of earth roads is becoming one of the most popular issues of to-day in improving existing earth roads. The earlier use of road oil was primarily for the suppression of the dust in many small villages, however, it soon became evident that the annual applications not only laid the dust but actually preserved the surface of the road somewhat and made them smoother and more free from mud following rainy periods. While the oil did not in many cases prevent the road from breaking through and rutting during severe winters, it did preserve the road in a much more serviceable condition a greater portion of the year.

It was this preserving effect that extended the use of oil into rural territory. While the people who used the oiled earth roads were impressed with the increased pleasure of driving over a road which was free from dust they were more impressed with the smoothness of such roads and the satisfaction of knowing that they could use the roads from early spring until late in the fall without the least fear of being stranded in the mud.

While it is evident that the oiling of earth roads does not make them of a permanent character, the tax payers seem satisfied with the annual expense of oiling for the added pleasure and service that they get out of the roads during the nine months of heaviest use, namely: Spring, summer and fall. The average user of earth roads is willing to bear three or four months of bad roads during the winter if he has some assurance of reasonably good roads the balance of the year.

It should be kept in mind that the main purposes of oiling earth roads are to suppress the dust and aid in maintaining a smooth and waterproof surface. The oiling and dragging of an earth road will not change its type; it will always remain an earth road and it is nothing more than folly to expect anything like a permanent road to result from the continued use of road oil. A great many have conceived the idea that after the road has been oiled systematically for a number of years that the surface of the road will become saturated with oil and no further oiling will be necessary. This is far from true and the tax payers should be warned against such expectations. The writer has had occasion to examine a number of streets and roads that have been oiled annually for a period of ten years and while it takes a little less oil after the road has been oiled a few years, there

is no indication that such treatments may be eliminated if the desired results are to be expected.

There are, however, a very large number of earth roads that can be effectively maintained by the intelligent use of oil and the road drag. It should not be expected that the oiling and dragging of the main traveled roads will make them satisfactory for heavy traffic. The conditions and requirements of every road should be studied very carefully before it is possible to determine the most economical type of improvement. It is evident that a well graded and drained earth road or well drained and oiled earth road will in many sections of Central and Southern Illinois satisfy the requirements of traffic about as well as the hard surfaced roads will in sections of the State that are very densely populated. Many main traveled roads, however, may be oiled preparatory to the hard surfacing material as the oiling of such roads will give immediate relief and will satisfy the traffic until such time as a community is able to finance more permanent improvements or until the traffic justifies a better surface. It may readily be seen that while oiling does not make a substitute for a hard surfaced road it may serve and aid as a means to that end.

While the oiling of earth roads in Illinois is comparatively new and there is very little definite information available concerning the cost or economy of such construction, a careful examination and study of the majority of such work done clearly indicates that it is a justifiable expense on a great many earth roads when intelligently used. The oiling of earth roads seems particularly adapted to sections that have light loads and a preponderance of pleasure traffic. It is apparent that the expense of oiling many roads is justifiable from the standpoint of the increased comfort to pleasure drivers. There are other points that aid to justify the expense on many roads, aside from the suppression of the dust and the aid in maintaining a smooth and waterproof surface. The use of oil prevents the spread of disease, the encroachment of weeds and sod upon the traveled portion of the highway and the excessive erosion on hillsides or places that are inclined to wash badly.

Owing to the lack of sufficient information concerning the oiling of earth roads it is impossible to prescribe definite rules and methods of procedure but a very careful study of all the roads that have been oiled clearly indicates that there are a number of things that should be taken into consideration to secure the best results.

GRADING.

The mistake is often made of attempting to improve a road without first grading and draining it. When a road is graded for oiling, graveling or any other form of surfacing, a permanent grade line should be established. Money spent in properly grading on earth road is not wasted, but has practically its full value when such a road is designated for later improvements. The great advantage of establishing a permanent grade and cross-section before the road is oiled is to utilize the oil soaked crust of earth as a foundation for later improvement, such as gravel, stone, brick or other hard road surfaces. If oil, gravel, or other surfacing material is applied to an improperly graded road, a very large portion of the material will be distributed and practically wasted when later improvements are demanded. In other words, money that is spent upon the public highways should be spent with a view of further improvement that will naturally be required as traffic increases.

A very large number of failures in the oiling of earth roads can be attributed to the improper condition of the road prior to oiling. The continued dragging and oiling of an earth road gives practically the same results. They are both used to maintain the surface, hence the necessity of having the road properly constructed before using oil or the road drag.

PREPARATION OF SURFACE.

An earth road may be properly graded and drained and yet the surface of the road may not be in proper condition to receive the oil. A great deal

of care should be taken in preparing a road surface for oil. To secure the best results, the surface should be smooth, free from dust and loose material, vegetation, sod or foreign material of any kind. It should then be rolled with a heavy roller, a tractor or opened to traffic until the entire surface to be oiled is uniformly compacted. The use of an ordinary drag on the road following several rains prior to the oiling will assist materially in making a suitable surface. If the road is rutted or dug out in holes or depressions sufficient to retain water on the surface, it should be made smooth by the use of a drag at suitable time prior to the oiling.

OILING.

The best time to oil an earth road is soon after a light rain and before the road is rutted. However, the surface should be sufficiently dry to prevent the wheels of the distributor from picking up mud. It is much better to oil on a wet surface than on one which is covered with dust.

After the road has been properly graded and drained and the surface prepared, the oil should preferably be applied from a pressure distributor. The pressure distributor will apply the oil more uniformly and more nearly in the desired quantities.

The amount of oil that should be applied will depend somewhat upon the condition of the road. If the road has been previously oiled, one-quarter gallon per square yard per application may be sufficient. However, if the road has never been oiled, it may require as much as one-half gallon per square yard to secure the desired results. It is much better to apply small quantities of oil oftener than to apply the entire amount for the season in one application. One of the best oiled roads that the writer has inspected was treated four different times during the summer season at the rate of one-eighth gallon per square yard per treatment. When too much oil is applied in one application it is not only wasted but is often very disagreeable to traffic. Where the oil is applied in small quantities at different seasons of the year, the oil retains its life and keeps down the dust much better, besides, it makes a more waterproof surface.

MAINTENANCE.

The success of an earth road or an oiled earth road depends almost entirely upon its maintenance. It is folly to expect that an earth road or an oiled earth road will remain good without constant attention. The addition of oil on an earth road may relieve it of a portion of the usual maintenance expense but it should not be expected to be a substitute for maintenance. The dragging and oiling of an earth road are so closely connected that it is almost impossible to separate them and expect the best results in the maintaining of an earth road surface. The continued dragging of an earth road will be a success without the assistance of oil but the oiling of an earth road cannot be entirely successful without the assistance of the drag.

The statement has been made that if the same amount of money is spent in the dragging of an earth road as would be spent in the oiling of it, that it would be equally as good without the oil. It is true that many earth roads can be economically maintained by the continued use of the drag, but, the best results can only be expected where both are used intelligently.

SANDING OIL SURFACES.

Better results can be secured from sanding the road slightly after either hot or cold oil has been applied. Clean hard sand is much better on a road surface than dust or the sweepings from the road. A hot oil application should be followed with a light dressing of sand, or the traffic will likely pick up the oil and make the surface of the road very uneven. Sand may be applied at the rate of one cubic yard to each 150 square yards of road surface. It may be applied by shovels from a wagon or from a special apparatus for distributing the sand.

The application of sand gives an oiled earth surface more stability. The sand retains the oil, assists in preventing wear, and aids in keeping

down the dust. A light application of sand is a justifiable expense on a majority of oiled earth roads.

OILING SAND ROADS.

There are many sections of roads in Illinois that are very sandy and will necessarily have to be handled differently than the ordinary earth road. Where it is possible to mix clay or loam with the top four or five inches of sand before oiling much better results may be expected. A suitable clay or loam can usually be secured at a reasonable distance from the sandy section. Where possible, the sand and clay should be thoroughly mixed and allowed to compact under traffic before the oil is applied. The sand-clay road will permit a slightly heavier oil than the ordinary earth road.

If there is no clay or loam within reasonable distance of the sand road, it may be materially improved by mixing a heavy oil (70 to 90 per cent asphaltic product) with four or five inches of the top layer of sand. This can best be done by applying about three-fourths gallon of oil and then covering it with about one inch of the sandy soil from the road side, then applying about one-half gallon of oil and another layer of sand. By building up successive layers of oil and sand, it is possible to apply from one and one-half to two gallons of oil per square yard of surface. This amount of oil mixed with four or five inches of the sandy soil will form a solid oil and sand crust that will hold up light traffic. The cost of such applications will vary from \$800 to \$1,500 per mile of road fifteen feet wide.

The cost of applying a four or five-inch layer of clay or loam that may be secured within one mile of the road, and mixing it with the sand, will be about the same. It is generally recognized that the mixture of sand and clay is more serviceable than the mixture of oil and sand.

THE COST OF SURFACE OILING.

The cost of preparing a public road for an oil treatment may vary from \$100 to \$2,000 per mile. However, the grading and preparation of an earth road should not be charged against the cost of oiling. The oiling or dragging of an earth road is a maintenance proposition and should be estimated separately from the building or preparing of the road. The road should be kept well shaped regardless of whether it is to be oiled or not. However, some cleaning is generally necessary prior to the first application of oil, and this cost will vary from \$25 to \$50 per mile of road.

Road oil can be purchased for from three to seven cents per gallon, depending upon the quality. It may be applied on the surface of the road at the rate of one-fourth to one-half gallon per square yard. The cost of oil therefore, alone may vary from \$75 to \$275 per mile of road, 15 feet wide, depending upon the quality and quantity of oil applied.

The cost of applying the oil will vary, depending upon the length of haul and the kind of equipment used. This cost may be estimated at from \$50 to \$150 per mile of road 15 feet wide.

The above figures show the cost of oiling to vary from \$150 to \$475 per mile of road. With average conditions and with a medium priced oil, the average cost of oiling alone per application may be from \$200 to \$250 per mile of road 15 feet wide.

QUALITY OF OIL.

A great deal depends upon the quality of the road oil used. A light greasy paraffin oil will lay the dust for a short period but will aid very little in preserving the surface of the road. Such oils are usually very annoying to traffic, soon after their application and often become slippery when wet. They also evaporate very readily; so there is very little residue left to seal the pores of the soil and hold down the dust. The light oils that have a natural asphaltic base or a semi-asphaltic residue have more lasting qualities as they more completely fill the pores of the earth surface and readily shed the water and prevent the formation of dust. While the natural or semi-asphaltic oils may cost a little more than the light greasy

paraffin oils they will not have to be applied as often or in as large quantities and in the end will usually give the best results. The semi-asphaltic oils having a so-called asphaltic residue of 40 per cent to 50 per cent are satisfactory for earth roads. Good results may also be expected from the use of a 50 per cent product, although material containing 50 or 60 per cent residue must be heated before applying.

The best grade of natural asphaltic oils for earth roads will vary from 50 to 65 per cent in asphaltic content, and which may ordinarily be applied cold. In no case should an oil be used which will not penetrate the surface of the road. A heavy thick oil even though it is heated before applying is inclined to lay on top of the road and form a hard crust that readily breaks off in large pieces allowing the road to dig out in holes. This also permits surface water to enter and in such cases the road does not dry out readily but often becomes worse than if the oil had never been applied.

SPECIFICATIONS.

The following specifications will give a suitable product for surface oiling earth roads. Specification "A" is used for the natural and semi-asphaltic oils and "B" for the best grades of paraffin oil.

"A"—SPECIFICATIONS FOR OIL FOR SURFACE TREATMENT OF EARTH ROADS (COLD APPLICATION).

1. The oil shall be a fluid product, free from water.
2. *Specific Gravity.* Its specific gravity at 25°C. (77°F.) shall not be less than 0.910 (23.8°B.).
3. *Total Bitumen.* It shall be soluble in chemically cold carbon disulphide to the extent of at least 99.5 per cent.
4. *Naptha Insoluble Bitumen.* Of the total bitumen not less than 5.0 shall be insoluble in 86°B. paraffin naphtha, at air temperature.
5. *Fixed Carbon.* The fixed carbon shall not be less than 4.0 per cent.
6. *Viscosity.* When 240 cc. of the oil are heated in an Engler Viscositymeter to 50°C. (122°F.) and maintained at this temperature for 5 minutes, the first 50 cc. which flow through the aperture shall show a specific viscosity of not less than 5.0 nor more than 20.0.
7. *Loss on Evaporation.* When 20 grams of the oil (in a tin dish 2½ inches in diameter and ¾-inch deep, with vertical sides) are maintained at a temperature of 163°C. (325°F.) for 5 hours in a N. Y. Testing Laboratory oven, the loss shall not exceed 25 per cent by weight.

"B"—SPECIFICATIONS FOR LIGHT OIL FOR SURFACE TREATMENT OF EARTH ROADS (COLD APPLICATION).

1. The oil shall be a fluid product, free from water.
2. *Specific Gravity.* Its specific gravity at 25°C. (77°F.) shall not be less than 0.890 (28.3°B.).
3. *Total Bitumen.* It shall be soluble in chemically pure cold carbon disulphide to the extent of at least 99.5 per cent.
4. *Viscosity.* When 240 cc. of the oil are heated in an Engler Viscositymeter to 50°C. (122°F.) and maintained at this temperature for 5 minutes, the first 50 cc. which flow through the aperture shall show a specific viscosity of not less than 5.0 nor more than 20.0.
5. *Residue on Evaporation.* When 30 grams of the oil (in a tin dish 2½ inches in diameter and ¾-inch deep with vertical sides) are evaporated until a residue of a penetration at 25°C. (77°F.) of 10 millimeters is obtained (when tested with Dow machine, No. 2 needle, 100 grams, 5 seconds), the weight of the residue shall be at least 40 per cent of the weight of the oil taken for evaporation. At no time during this evaporation shall the oil be heated at a temperature to exceed 250°C. (482°F.) [Applause.]

CHAIRMAN BURROUGHS. The next topic is "Proper and Improper Road Construction," by Mr. John W. Sanner, of Decatur.

PROPER AND IMPROPER ROAD CONSTRUCTION.

(John W. Sanner.)

MR. CHAIRMAN, LADIES AND GENTLEMEN: I was unfortunately situated this afternoon, having charge of the boys' short course class and having an extra examination, I was a little later than I intended to be, hence I was not here in time.

In treating a subject as vitally important as this and do the topic justice, it will be necessary to bring from other states experiences that we may be guided intelligently and that our conclusions may be based upon determinations, rather than uncertainties.

Road construction in this section is in its infancy, all or nearly all the work done is experimental and of a temporary nature. Up to the present, no materials have been applied to building road surfaces that are substantial or enduring.

Almost limitless sums of money have been expended in a shiftless manner to pull the traveling public out of the mud, always to find that during the rainy seasons or during the time when the frost is coming out of the ground, little progress has been made toward a permanent system of roads for all seasons.

The method of piling dirt in the center of the roadway will never produce the desired surface upon which travelers may safely go loaded or unloaded at all seasons.

A fruitless attempt has been put forth in a few localities to build roads of a permanent nature by the use of gravel and sand. Where this process has been executed honestly, fairly good results have resulted, but in cases where any considerable clay has been utilized together with the gravel, a partial failure is the result, depending largely on the quantity of clay that was used. Then, too, where the builders of roads have applied the gravel in piles, the subsequent condition is more like corduroy than a nicely graded surface.

It seems almost an impossibility to manage the public money in such a manner as to eliminate graft, road building not being the exception. Contractors and day laborers alike seldom perform their full duty, this to the detriment of the business in which they are engaged and the injury to the public. Public competitive bidding has not robbed contracts of the rake-off. In all this the taxpayers and public generally suffer, while the few increase their bank accounts.

Perhaps there is one feature of road construction upon which all agree, and that is drainage. However, all are not agreed as to the best method of drainage. Some advocate surface drainage for the simple reason that the water can be seen coursing its way to some more or less permanent outlet. Others are of the opinion that a permanent system of drainage should be adopted that the surface soil to a depth of four or more feet may be prevented from becoming at any season saturated, thus establishing the first and doubtless the most vital essential in permanent road construction.

Wherever surface drainage is the common practice, limitless and constant repairs are annually being made. Then, too, the increasing hazard to the traveling public by virtue of the ditches on one or both sides of the road are features that should put a stop to this temporary method. Public safety as well as permanency should be the ruling influences rather than trivial and unsubstantial systems of road construction.

After having traveled by automobile over many thousands of Central Illinois roads, the most expensively constructed not having escaped us, we have arrived at some conclusions that are worthy of consideration.

One of the serious mistakes in road building is the ridging the crown too high. Under no condition can this method be accepted as economical or reasonable. The unreasonably high ridge is being constantly torn down by traffic and when this surface is wet, there is always danger of automobiles being ditched.

Tile being placed on one or both sides of the road will eliminate the necessity of piling dirt in the center of the roadway to keep the traveling

public from miring. The parallel system should be employed by landowners and this system should be extended so as to drain all the public highways.

Another feature of road construction that has been in vogue from time immemorial, is placing culverts at frequent intervals so the water on one side of the road may pass through and into the ditch on the other side of the road. Culverts may be a necessity in some places, but in a majority of instances they can be supplanted by installing catch basins so the water can be taken rapidly into the tile ditch, thus preventing saturation of the road surface. It is true it takes more faith in this instance as the observer can not see the water running along the road, but the traveling public will be enabled to travel at any season of the year with that degree of safety which borders very closely on pleasure, even in the wettest seasons.

In making a comprehensive study of road construction, we are impressed with the high cost per mile of our hard surfaced roads as compared with wider and better surfacing in other states. There are only two reasons that the writer can discover that may be the cause for this extravagance, inexperience or graft. When California can build a road twenty-four feet wide for less than one-half of what Illinoisans are compelled to pay to construct a nine-foot road, we wonder why the public does not make some inquiry into the expenditure of their money.

It has been charged by one in authority that all surfaces other than hard surfaces are maintenance propositions. We desire to change that by reversing the opinion so it will sound different. No construction of any kind is other than one needing regular and constant attention that it may be kept from deteriorating.

Suppose we establish a system of hard roads in Illinois as has been done in adjoining states, will the producer be able to market his produce at a reasonably sum per ton? This is one of the points that is dwelt on by all advocates of taxing the land for the purpose of creating a system of hard roads, that the farmers can deliver their products in market during such times when the roads are ordinarily unfit for heavy traffic. Can this theory be substantiated by citing experiences of farmers in states where materials are plentiful with which to make hard roads? Take, as an illustration, our neighbor on the east, Indiana. Is it legally possible to haul heavy loads on the hard roads there? The following is the Indiana statute limiting tonnage, and may be of interest to those who read this. Comment is unnecessary and would be altogether superfluous.

"Highway Laws of Indiana," page 101, section 419. Heavy Hauling.

"It shall be unlawful for any person to haul over any turnpike, macadam, or gravel road (the term 'gravel road' to include any road graded and graveled with not less than one yard of gravel to eight feet in width and nine feet in length of such road) at any time when the road is thawing through, or by reason of wet weather is in condition to be cut up and injured by heavy hauling, a load on any vehicle with tires of less than three inches in width, the combined weight of which load and vehicle, including the driver, shall be more than twenty-five hundred pounds; or any vehicle with tires of three inches and less than four inches in width, the combined weight of which load, vehicle and driver, shall be more than three thousand pounds; or on any vehicle with tires of four inches and less than five inches in width, the combined weight of which load, vehicle and driver, shall be more than thirty-five hundred pounds; or on any vehicle with tires five inches or over in width, the combined weight of which load, vehicle and driver, shall be more than thirty-eight hundred pounds.

"Any person violating any provision of this section shall, on conviction, be fined not less than five dollars nor more than fifty dollars for each load so hauled: *Provided*, that any road supervisor or gravel road superintendent shall have police power to arrest upon sight any person who is seen violating or by warrant any person who has violated, any of the provisions of this section within the county or township for which such road supervisor or gravel road superintendent is elected or appointed, and that, on conviction of the defendant in such cause, there shall be assessed by the court

trying the same, a fee of two dollars in each case, to be paid to the person making such arrest."

In the face of the above, what will become of the tractor trains, the modern means of delivering farm commodities to market under the most modern and economical method evolved? These trains are made up of an average of nine wagons, each of which contains an average of about two hundred bushels of shelled corn.

Under the most trying conditions, the oiled surfaces have been perfectly satisfactory, even the heavy tractors with their trains of heavily loaded wagons have not injured them.

Since our public highways have been and are liable to be expensive, it would seem economical and possibly necessary to adopt other methods than those in common practice, looking toward reducing as much as possible the burden of expense in the original as well as the maintenance expense of all our public thoroughfares by employing laborers that are available at a nominal wage. Colorado has in recent years built many miles of roads by employing convicts. Judging from published reports relative to the matter of road construction, it would be an advantage to the taxpayers of Illinois should this method become an established practice here. The economic phase of this question is not only plausible, but practical. It seems unfair to taxpayers generally to be compelled to support in idleness many hundreds of able bodied men when, not only their services can be made of incalculable benefit to the general public as well as placing a fund at the disposal of the men after having served time or the support of those who are dependent upon the convicts.

Another feature of road maintenance that is lost sight of is standardization of treads and tire widths on all vehicles. No conveyance should be used for pleasure or profit that has a tire so narrow that when taken on the public highway, said highway may be injured. This does not necessarily mean during wet seasons, but the student and observer has many instances at hand where the road has been made almost useless until smoothed down after a wagon loaded with a ton and a half or such a matter, has cut through a hard dirt surface, leaving ruts two and often four inches deep, where a wide-tired wagon would not only not have injured the road but would have improved it by packing and making the surface smoother than before.

I thank you. [Applause.]

Mr. BURROUGHS. Ladies and gentlemen, an open discussion is now in order.

Mr. B. F. STAYMATES. It is bad form for me to bring up a subject like this in a farmers' institute, but I do not wish to begin this without a complimentary allusion to Mr. Gash, a more lovable gentleman does not exist, and I think we should temper all of our hatreds with love. His argument is the one thing I am going to combat, his personality is very good, he is a member of my church and of my lodges and a member of the remnant of this Illinois democracy that some people think is now rapidly disappearing.

There are two sides to this road question, and as I tell you during my long term as your representative, I have fought it bitterly, you know who I am. There are two sides, the inside and the outside. Mr. Gash represents the outside of this question and God Almighty knows you represent the inside, you and I. We own these placid farms—we have some farms—beautiful ones in this country, and we paid the taxes on those farms, and our good old fathers cut the soil and farmed the farms in times gone by. The roads were cut out to make entries to the different farms, we have made them and we own them, our sweating blood made them. I think it is only fairness that an Institute like this should have a farmer on the road to tell our side of this, and I shall ask the officers of this Institute to write to the people to see that this is done. Stop the horse play. I don't blame my friend Mr. Gash for asking for stone roads. My friend Gash has handled the question with velvet gloves but I am going to handle it with clean-cut Anglo-Saxon blows straight from the shoulder, not so nice as he possibly,

but just as effective. He represents the city of Chicago, forty years a practicing attorney in it, and he comes down here and gives us information about the life of a horse. I am glad to know that one can work twenty-seven years. I did not know that. Why, in the heart of the city of Chicago there were two hundred syndicate taxpayers that wrote this road bill, and carried it to Springfield, and when they got it sponsored down there it was to hide its origin, but its purpose was to bond the State of Illinois and bond the unborn races of people in it from one end of the State to the other and the rich increment from it. Can I blame him for recommending these stone roads, these joint tentacles which they are going to put through the country to squash the hearts of the people? I am not going to abuse him, but I am going to abuse you for not doing your duty when those remarks were made on the platform, in order that we may get a fair decision between the two sides. We own the farms, we own the roads and we pay the taxes and we should have the first voice and not the one that we have, which is about the size of a Hottentot voice in South Africa in the affairs of the British Government.

I want to deal with two statements that he makes here, he states here that some fellow in a great eastern convention, said that he was from the State of bad roads, the State behind the times. This year I traveled twelve thousand miles and last year six thousand miles on this subject, and I sat with the governor of New York one hour in his office and I never heard a greater tribute ever come from the lips of a man than came from that man.

I talked with the highway commissioners of Massachusetts, New Jersey and Rhode Island, and I am going to master this subject for you and your State; I am going to know what is in it. I know how to tell it and I want to say to you that I am not afraid to mince words and I say right here that I hardly took that great slander. I don't know whether it was the state of Massachusetts or New Jersey that sent that slander to this section, and I know that Mr. Gash is too good a man and too noble hearted to slander it, but I am too good an Illinoisan to listen to it without resenting it and I resent it with good red blood. I have the greatest feeling against the man that slanders our roads, because he slanders you and slanders our people when he does that.

Another statement he made, eight cents an acre—He said that in Bloomington you would have to pay for twelve years but he differs here, he says twenty years. I will take his Bloomington remark, eight cents an acre. How many acres in your county, 603,000 I believe. In my county there are 250,000 acres and multiply 250,000 acres by eight cents, that is \$20,000—if you cannot multiply ask your little girl six years old to do it for you. Let me borrow one of Mr. Gash's lanterns and look at the elements of this question.

Twenty thousand dollars, that is for our entire acreage of Dewitt County, how many miles of road will that build? One picayunish contemptible little mile of concrete road. He expects one of you out of five—five out of six will sit here and go to sleep listening to that. He knows very well the sixth man refutes it and I do, I am sorry that he descends to that form of tactics, that form of unfairness. It is impractical and it is a ridiculous proposition.

Let us go a little further. If that \$20,000 will build one mile my county has a thousand miles of roads, a little over. Now, how long will it take to hard road Dewitt County? If mathematics don't lie it will take just one thousand years. Now, these gentlemen are just as generous with time as they are with our money. We suppose for instance that he only wants to hard road one road in ten, that will take one hundred years.

Dr. Baker of the University of Illinois, the greatest living road expert, says that the life of a hard road is ten years or less. In Germany and Austria where the travel is sustained they say it wears out three-quarters of an inch a year. Let us take Dr. Baker's estimate and say that Dr. Baker's estimate is correct, you will have to build ten roads before the

first one is paid for. Let us go a little further. He tells you the State of Illinois is going to put 16,000 miles in the State of Illinois. Now, I can quote right here President Baker of our Illinois Central Association, of good roads, as an authority that these roads will cost \$20,000 a mile. Well, supposing the Massachusetts price is correct, the one that the governor of Massachusetts told me, that they cost \$15,000 a mile in Massachusetts where they do not have any hard base to make, and there is only 1,200 miles in the state. Take 16,000 miles and multiply it by \$15,000, the cost of one mile, what is the product? Two hundred and forty million dollars, and that is too cheap—\$240,000,000. That is the mistake you are making, you people of Southern Illinois. You are the best people on earth, but you cannot pay one-third or one-fourth of it; you occupy half of the State and your taxes are a little less than one-third of ours, but you are the people more than any others who will have to pay for it. The city of Chicago by the increment from this law is repaid from your pockets. They got your county and mine and McLean and Macon County down there and put an option on the roads in the county just as they did in other states, but we are not bound yet. Two hundred and forty million dollars! Some of you are getting tired of cheap taxes I suppose, and think you are not paying enough, and want to double it. Why, this will quadruple your taxes before you pay for it.

I want to speak to Mr. Gash now, I have spoken in forty counties and ten states, and I am going to make it clear that we don't intend to build his stone roads or his 16,000 miles of roads, but my friend's sentiment there, he expects us to assist in building dirt roads and oiling mud roads, I like my friend's sentiment over there, and gentlemen, we will do that, but when we come to the other proposition that our friends in Chicago laid down for us we won't do it. I want the millionaires up there to prosper, I don't care if they prosper, but I don't want them to prosper at your expense or mine. There is no more fluent talker than Mr. Gash, he is a poet and an orator, but his poetry needs my mathematics to make his picture complete. Just one more statement. He told you that the farmers only paid forty per cent of the taxes. Are you going to believe that? Take the United States census, wealth of Illinois, \$8,816,000,000. The farm wealth \$4,800,000,000. About one-half. That don't include the retired farmers who live in towns, that does not include the incomes from wealth that is derived from banks and town properties. No human being can figure that less than two-thirds of the wealth of Illinois is the farm wealth. I am sorry that Mr. Gash has dared to tell you that, and I am sure when he hears my figures he will be too honorable to say it again. Those are the kind of lies you hear on the platform and don't answer and therefore I ask you to write the president of this organization, and ask him to have a practical farmer who knows his business, let him be put on the stand. I thank you. [Applause.]

Mr. BURROUGHS. Any further discussion? I want to give you all an opportunity to discuss this matter and if you don't we will adjourn.

There seems to be no further discussion so we will adjourn and we all hope to meet in another year.

Whereupon the convention adjourned.

MISCELLANEOUS ADDRESSES, PAPERS AND DISCUSSIONS.

LANDLORD AND TENANT.

(By Mr. Geo. S. Hoff, Danville, Ill.)

The topic of landlord and tenant is as old as the ages. It was the bone of contention in the early history of Europe and the immediate cause of many wars. As early as the Ninth Century in England there existed the feudal system.

The feudal system was a system of landlord and tenant. The liege lord was the holder of the land and his tenants were but little less than slaves. The tenant was not only a farmer who tilled the land for his lord, but he swore allegiance to his will and demands. In case of war he was bound to furnish a certain number of men for the conflict. The leasehold was handed down from generation to generation. This method often resulted in tyranny in mediæval times, yet there was in it a feeling that engendered the finer sentiments of the people and cultivated the idea of a home, permanent and more or less beautiful.

In the early form of feudalism, while the tenant expected to occupy the land until a revolt came, which probably meant for generations, yet he was treated much as a serf, and was bound to come at the beck and call of the landlord or the fee holder. Out of this grew unrest and discontent.

About this time America, with its teeming rivers, fertile prairies, and beautiful valleys was discovered and opened up to civilization. The religiously persecuted, the suppressed tenant, and farmer all sought refuge in the promised land of America. When, here, without government, other than their own, with vast areas of uncultivated land, with no restriction other than self preservation, and the necessity of providing for the wants of the body, came these people. We will not attempt to follow the formation of government, title and ownership of the land, the development of the country, further than to say that in the early stages of the settlement of the country an existence and the acquiring the simple home life with independence was the general underlying principle that influenced and controlled the settlers. Benefiting by the experiences of the ages, these people looked to a form of government that would perpetuate ownership and home building. With the Declaration of Independence and the framing of the Constitution of the United States, and the government of a free people, the right of ownership was assured and protection promised. From that time until about thirty years ago the land of the United States was occupied in a large measure by the owner who cultivated the soil for the support of himself and the comfort of his family.

To-day, large areas of the tillable lands of the United States are occupied and the great valleys and the hillsides of this vast continent are cut up into beautiful farm homes. To be sure the soil in the various states and localities varies in quality and fertility. We have come to face this one fact, that there is no more land to be made, there is no more land to conquer, there is no more virgin soil to be claimed, and since that is true we have been made to stop and wonder if the fertility of these vast areas would ever give out.

To-day, we are above feudalism, to-day, we have no liege lords who would rob the people of their sustenance, and deprive them of the comforts of life; we have, however, all of us to a greater or less extent been committing robbery in a bold and high-handed manner. You may look at me in wonder why I should attempt to accuse you of robbery and admit in the same breath that the accusation was equally true of myself, yet I believe before I am thru I will convince you that this is absolutely true.

We are living to-day in a fast age. We ask ourselves the question over and over again, "Why this high cost of living?" The answer for our purposes at least, is right, in fact that we are anticipating our income, we are anticipating our wealth, we are anticipating what right and properly belong to the future generation. To illustrate, a little more than forty years ago the land in this country, much of it, was condemned as swamp land and was sold at from 12½ cents per acre, as swamp land, up to \$1.25 per acre as Government land. In that time we have seen this land come up from the first named price to \$150, \$200 and even \$300 per acre. The owner of the land did not make that wealth.

This rapid advance has created in the landowner and land buyer the insatiable desire to participate in this rapid accumulation of wealth, and has created a speculative turn of mind over all the country. This has lead the speculator to deal in futures just as much as the gentleman on the Board of Trade deals in futures. Men have bought land without any hope or expectation of ever paying for the same. They bought land to participate in the advance. They did not occupy it. They expected to sell and take the profit early. They leased it then, under most favorable conditions for themselves, taking out of the soil everything that was in it, with the hope that it would carry its own load, and sell within a year or so at a handsome profit, thus anticipating that which he did not earn.

The tenant on the other hand said, I can have this land but one year or two at most, or until it is sold, and I will take out of it everything possible and put nothing back. The result is the landlord robbed it, the tenant robbed it for self preservation, and it is kicked off to the highest bidder, with an impoverished fertility to the extent of every bushel of grain that could be gotten out of it. As a result of such procedure there has been, in the last thirty years discarded, and abandoned more than 9,800,000 acres of impoverished or worn-out land, and this period of thirty years covers practically the period of tenancy in the United States.

Most tenants are found where land is highest in value, and in the group of North Central states of which we are a part, the increase in tenancy has been about as follows: In 1880, 20.5 per cent of the farmers were tenants; in 1890, 33.4 per cent; in 1900, 27.9 per cent; in 1910, 28.9 per cent. In 1880 out of every one hundred farms in the United States, 25 were occupied by tenants, in 1890, 28; in 1900, 35; last census, 1910, 37. In other words, in thirty years tenant farms have increased 130 per cent, owned farms have increased by 34 per cent. The proportion of tenants as compared with the value of land might be interesting to note in this connection as follows: The highest priced land, the per cent of tenancy was 29, modern priced land 21, lowest priced land 16 per cent. This would indicate that tenants are in a measure a shifting class and not permanent, that they would leave the worn-out or cheaper lands and go to better or higher priced lands. Underlying it all is the desire and the inclination, which is laudable and right on the part of the tenant, to accumulate enough from the tenancy to enable him to leave the high priced land section and to purchase a home for himself in newer countries, or where land is not so high priced.

We are face to face with the facts that in thirty years we have worn out and abandoned in the United States more than nine million acres, that in recent years the production of our cattle, hogs and sheep in the United States has been on the decrease, and the fact that land everywhere has advanced, and in our own sections very rapidly, yet our production per acre has decreased, as is shown by the census of the United States, and by the following figures taken from the Chicago Tribune of December 31, 1914:

CORN.		OATS.		BARLEY.	
Crops.	Production per acre.	Crops.	Production per acre.	Crops.	Production per acre.
1912.....	29.2	1912.....	37.4	1912.....	29.7
1913.....	23.1	1913.....	29.2	1913.....	23.8
1914.....	25.8	1914.....	29.7	1914.....	25.8

Wheat, however, is an exception to the rule and has held its own. We are compelled to admit that these figures and ratios are not accidental; that we must look for a remedy and must look for it soon, and that our results should come speedily.

I realize that when I attempt to discuss ownership and tenancy, and point out, as I have endeavored to do, our mistakes, that I am in danger of creating antagonism with the landlord, and having him say, you have attacked our methods and left us stranded. I realize that to find remedies for the faults that I have talked about, to suggest how the robbing the soil may be prevented, to show the landlord how he may spend large sums of money on his land to help the tenant, and yet get adequate and ample returns for the expenditure, I have undertaken a big job. I am turning aside from the popular line of discussion, entering paths new and unfamiliar. I have accused both tenant and landlord of robbery; have proven by statistics that our production per acre, per annum is decreasing; that our land is all taken up; that we were abandoning the worn-out land and leaving it uncultivated and uncared for, all of which is true, and to overcome this something must be done, but how? We will agree that there are at least three essential factors governing the success of farming. First, knowledge; second, executive ability; third, business ability.

Under the head of knowledge goes the practical knowledge of climate and soil, the scientific knowledge of the composition of the soil; the knowledge that each crop or variety of crops takes out of the soil certain chemical properties, and without the chemical properties of the soil the particular variety of crops could not be successfully raised.

It is worth while for the farmer to know that every bushel of corn takes out a large proportion of nitrogen and phosphate and other chemical properties of the land. It is estimated that the phosphate alone taken out of the soil by a bushel of corn is about 1.7 pounds. It is necessary to have the knowledge how this chemical with others can be returned to the soil in the most economical manner.

No matter how intelligent, or how much scientific knowledge the farmer may have, if he is short in executive ability, if he is not capable of taking advantage of the situation and of circumstances as they present themselves, neither the landlord nor the tenant can possibly make good.

Every farmer must have the business ability to be able to see beyond the present and determine by his foresight whether it is a money making proposition to raise 100 bushels of corn, or any other yield per acre year after year and not replenish the soil with what that yield takes out. He should be able to determine for himself that this line of procedure means failure sooner or later.

A few years ago the average farmer knew nothing of the character or the chemical properties of the soil. It is not uncommon to-day, however, to hear not only the landlord but the tenant say that this field or that field needs certain chemical properties to make it produce. This knowledge is valuable; this knowledge is what every farmer must have. With this knowledge and an inclination to keep up the farm, comes a sure remedy for all of our difficulties. If we put back into the land all the straw, stocks, stubble and grain that grew on it, we will be constantly returning to the soil the chemical properties taken out of it. Returns from year to year will become better, and loss from the soil will be nothing, or practically nothing.

This can be done only by feeding and stock raising. If stock can be fed on the land from year to year, eating up and distributing over the soil all that grew on the land, we will scarcely need think of commercial fertilizer, as very little, if any, of the chemicals now found in the soil will be taken out.

The landlord immediately says, "The tenant, as a rule, does not have the finances with which to handle the necessary stock to eat up the grain grown on the farm. To furnish the tenant with the means to do this is a burden added to the landlord that should not be, and in many instances

the tenant lacks the knowledge and the executive ability to feed the stock and care for it even if it were furnished."

Encourage the tenant to give more attention to stock; come at it gradually, and in a small way. Give him better fences, better buildings in which to shelter and keep the stock. Give him more pasture, and as a result tenants who are worthy of staying on your farm will soon be competent and successful stock men. Mr. Landlord, it will pay in view of the fact that you are constantly improving your assets; at the end of each year your land is better and worth more from a productive standpoint than it was the year preceding, and will bring greater returns.

Practically the only chemical properties that most of the land needs, that we cannot readily get from rotation in crops is lime or phosphate. We can sow clover on the land, return to it nitrogen in great quantities, and possibly keep up on that line. We can turn back to the land all the straw and stock and such like and turn into it from year to year some phosphates, but without stock, without other sources from which to obtain the phosphate or lime, it will be necessary to distribute it on the land either in the form of limestone for the lime and rock phosphate for the phosphate. If this is done for a short time on our worn-out land it will not be necessary to add so much, because we can add to it by rotation of crop, properly distributing all barnyard manure.

To do this the landlord and the tenant must reach an agreement that will give the tenant time to reap the benefit from such distribution, if he is to do any considerable part of the labor, or furnish any considerable part of the material. It would hardly be fair for the tenant to furnish this at his own expense, but rather it would be fair to divide the expense between the landlord and the tenant. The tenant who is worthy of a long lease on a farm is entitled in this country to better buildings, to better fences, to better conveniences, and the landlord says, "How can I afford to do that?" My theory is that with better buildings, better conveniences, with a reasonable distribution of the profits will come greater returns to the landlord, because of the fact that it will develop longer leases, with better farming from better tenants, and more stock.

It is not possible to eliminate all of the troubles in one fell swoop, but since the majority of the land in our country is rented or leased on crop payment plan, the landlord and the tenant are partners, and what benefits the tenant must of necessity benefit the landlord. While the tenant is interested in immediate returns and quick profit, the landlord is also, but the landlord must of necessity be interested in the preservation and conservation of the fertility of the soil, as it must be his source of income in years after the tenant has passed on.

Therefore, it is not immediate and quick returns so much as constant and persistent returns, and this only can be had by conserving the fertility of the soil and constantly building it up.

The tenant must be taught to cultivate less land, and to do it better, to get a greater yield from an acre, must be taught and encouraged to grow more stock. We must come to that, and by so doing, the landlord will reap greater returns from his farm.

I do not believe that the landlords of to-day will permit the decreasing yield per acre as is shown by our recent census to continue, but I do urge that landlord and tenant get together and have a better understanding; that they join hands and work together for the restoration of the fertility and the preservation of our soil; work together for greater yield per acre and likewise greater returns for both landlord and tenant.

UNITY OF RURAL COMMUNITY.

(By Jewell Mayes, Secretary, Missouri State Board of Agriculture.)

The strength and service of any community is measured by unity of purpose. So long as a town or rural community is divided by suspicion and contrary purposes you will find progress lagging behind the local opportunity.

So much of organizing in the past has been resultant in dividing the people rather than uniting them. It is a mixed and mooted question as to what constitutes the elements of rural community—whether or not the rural banker and the rural merchant have a part in an agricultural community movement. There are those who ably and vigorously hold that none but the farmer should be permitted to join an agricultural organization for rural betterment, that the lines between the farm and the town should be widened, the farming interests and the country town interests arrayed against each other.

One viewpoint is that the "rural community" includes all the men and methods of production, distribution and supply; that the farmer is the brother of the common good with the rural banker and the merchant; that a dollar of profit coming into the neighborhood will directly or indirectly benefit everybody in that community.

SPIRIT OF THE GOLDEN RULE.

The rural community activity at its best includes the farmer, the tenant, the hired man, the doctor and other professional men, the merchant, the banker, and every soul that believes in making the community a happier and better place to earn an honest living in the spirit of the Golden Rule.

The rural community really and truly includes the country bank, the country store, the country town school and every interest of town and country. In the first family that ever graced this earth, one of the two sons of the first father seems to have gone into the retail and manufacturing business. Cain junior was the first hardware man.

There is a common ground of mutual interest between the retail dealer and the farmer, and disloyalty and failure of either or both to live up to duty has spelled commercial friction and trouble adown the ages.

"Community development" expresses the common ground where the dealer and the producer can and should meet for mutual cooperation.

Let us unite to foster larger efficiency along all lines of commercial and agricultural service, agreeing that human nature is the same in every avocation of life, and that the same percentage of skill and intelligence will be found in each trade, calling or profession, and that the same or similar amount of efficiency can be discovered among all classes of all sections when we shall have understood all phases and facts. Team work free from pessimism, will do most to advance any cause or calling.

Agriculture has the largest possibilities, and upon it depends all lines of business finally, and the farmer certainly should not resent or misunderstand why all wide-awake business men are anxiously interested in helping to boost farming and country life conditions. It is a nearsighted banker or merchant who fails to realize that the profit of the farm regulates the possible revenues of the country town.

Any law that especially encourages more profitable farming is not, in result, class legislation, because the advancement of agriculture spells the advancement of all lines of business, for the farmer feeds and clothes the world.

When the Golden Rule is the measure of cooperation, then and there you find eighty-five per cent of the local troubles in community cooperation fade away; then and there you will discover the dawning of a better day in community advancement to the degree that every citizen is boosting for what every other citizen seeks—single-mindedness for the common good—community unity.

SOME IMPORTANT INSECTS OF ILLINOIS SHADE TREES AND SHRUBS.¹

(By Stephen A. Forbes, State Entomologist.)

The protection of the shade trees and ornamental shrubs of Illinois against insects has been for several years a problem of rapidly increasing importance. Many of our most desirable trees and shrubs are liable to slow destruction by obscure insect pests understood little if at all by those

¹ Reprint from Bulletin No. 151 of the University of Illinois Agricultural Experiment Station, by Request.

immediately concerned. Trees which have grown for years, becoming more attractive, more valuable, and more highly valued year by year, begin to weaken and decay, the owner does not know why. This is often due to borers or to scale insects, the presence of which has not been detected or suspected, but whose injuries might have been prevented if the facts had been known in time. More sudden losses are frequently caused by

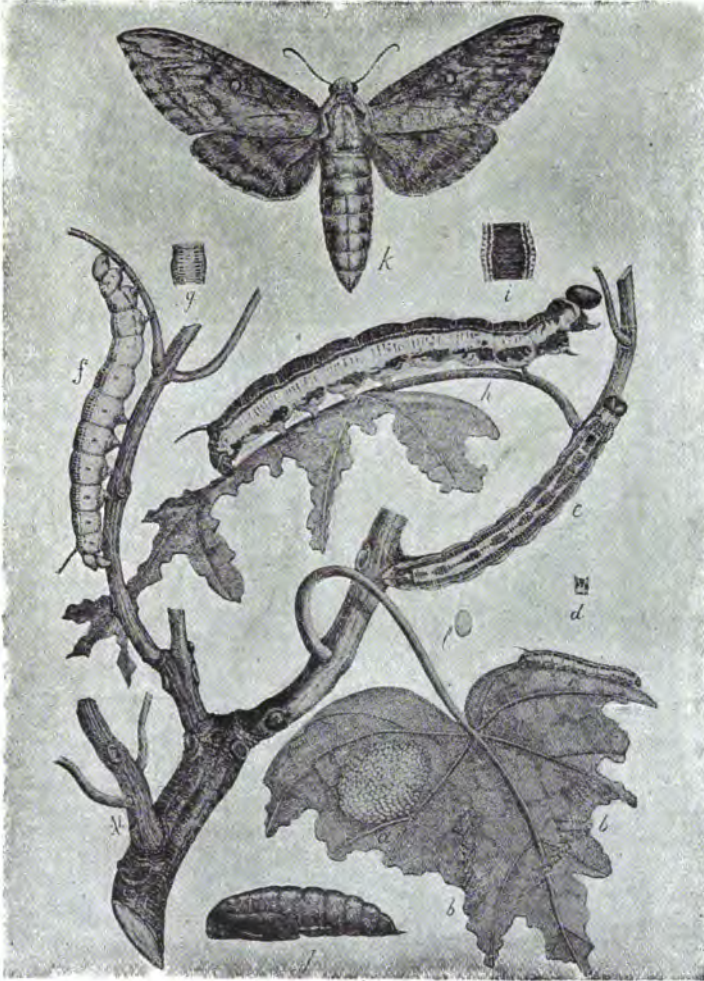


Fig. 1. *Catalpa Sphinx* (*Ceratonia catalpae*): a, egg mass; b, newly hatched larvæ; c, d, larvæ one-third grown and one joint showing its dorsal pattern; e, f, g, h, i, mature larvæ, variously marked, and single joints showing dorsal patterns; j, pupa; k, moth; l, egg, enlarged; others all slightly less than natural size. (Ohio Experiment Station.)

overwhelming attacks of leaf-eating insects which, altho conspicuous, are not dealt with because proper measures of procedure are not known. Observations and experiments upon this subject have been for several years a prominent part of the work of the office. Beginning in 1898, repeated careful examinations have been made of the trees and shrubs of the parks and boulevards of Chicago, and this work has been extended from time to

time to other cities and towns thruout the State. With the establishment of a field assistant in Chicago in 1907, the subject received more continuous attention at the hands, first, of Mr. H. E. Hodgkiss and, later, of Mr. John J. Davis, the latter of whom especially has made many studies of the life histories of species previously but little known, and has added a mass of details to our knowledge of the subject in all its parts.

The general subject is still under investigation, and will be in due time reported upon in a much fuller and more elaborate article, but the present brief preliminary paper has been prepared in the hope that it may be found of immediate practical use to municipal authorities in control of parks, boulevards, and streets, to town improvement societies, and to owners of lawns and other private premises the appearance of which they are striving to improve by the use of trees and shrubs.

THE CATALPA SPHINX.

(*Ceratonia catalpae* Bdv.)

One of the most destructive of the few insects to which the catalpa tree is subject is a large showy caterpillar known as the catalpa sphinx (Fig. 1). It is a southern insect, and has not been found in this State north of Clay and Richland Counties, altho it has extended up the Atlantic Coast as far as New Jersey. It is likely to appear suddenly in large numbers upon single trees, stripping them completely.

The full-grown caterpillar (Fig. 1, *e, f, h*) is rather strongly marked, with a broad velvety black stripe on the back and sulphur-yellow sides spotted with black, while the under side of the body is pale green. It is unusually variable in color, however, there being both light and dark forms. It is from two and a fourth to three inches long, and has a hornlike appendage projecting from the hinder end of the back. The young caterpillars (Fig. 1, *c*) are pale yellow and spotted with black. There are probably but two generations in Illinois. The caterpillars leave the trees and go into the ground to pupate (Fig. 2).



Fig. 2. Catalpa Sphinx.
Ceratonia catalpae, pupa in cell in earth.

The parent insect is a large heavy-bodied moth (Fig. 1, *k*) with strong, narrow, brownish-gray wings, with obscure lines and spots of black. The eggs (Fig. 1, *a*) are laid in masses on the leaves, sometimes as many as a thousand in a bunch, and the young, on hatching, feed at first in companies—a fact which makes it easy to destroy them if their presence is detected early, by picking off or spraying the infested leaves. A general spraying of a tree with arsenate of lead or Paris green will destroy the caterpillars at any time. Prof. H. Garman, of Kentucky, says that the nearly grown worms can be shaken or jarred down from most catalpa trees and readily destroyed by hand.

THE FALL WEB-WORM.

(*Hyphantria textor* Harris.)

The fall web-worm is the only common Illinois insect which makes a large conspicuous web in late summer and in fall, inclosing a considerable number of the leaves and twigs of a branch, together with a colony of caterpillars which feed under its protection (Fig. 3). It is unfortunately often called in Illinois the tent caterpillar, but the latter name is properly applied only to a caterpillar, not often seen in this State, which makes a

small compact web in the forks of a branch in spring, which it uses only for protection while not eating.

The web-worm is an almost universal feeder and has been found on about a hundred and twenty species of fruit, shade, and ornamental trees,



Fig. 3. Fall Web-worms, *Hyphantria textor*, and their web, on apple tree.
(New Hampshire Experiment Station.)

upon the leaves of which it feeds. It is one of the most annoying pests of the tree grower, its numerous large webs, enclosing brown, skeletonized leaves, making the tree very unsightly, and the injury done, as it spreads

from branch to branch, often being considerable. While the caterpillars are growing they do not wander from their common web, but enlarge this to cover fresh leaves as fast as those within it are devoured. When they have nearly completed their growth, however, they scatter far and wide, running briskly about when disturbed, and feeding on almost every green thing they find. At this time they become, when very abundant, an extremely destructive and annoying pest.

They are about an inch long when full grown, varying from pale yellow or grayish to a dark bluish-black hue. (Fig. 4, a, b.) The body is covered with long straight hairs grouped in tufts rising from small black or orange-yellow tubercles, of which there are a number on each segment. When mature, the caterpillars go to the ground, into which they burrow a short

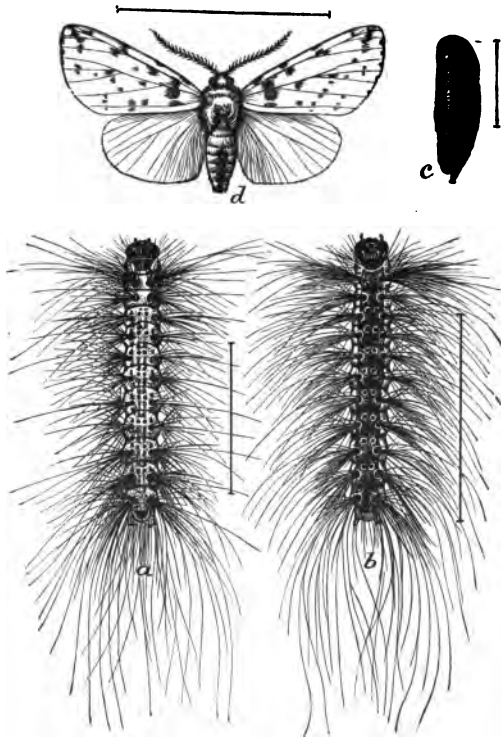


Fig. 4. Fall Web-worm, *Hyphantria textor*: a, b, larvæ, light and dark varieties; c, pupa; d, moth, spotted variety. All slightly enlarged. (New Hampshire Experiment Station.)

distance, or they creep under shelter above ground, where they form slight cocoons of silken web interwoven with the hairs from their bodies. Within these they change to dark brown pupæ (Fig. 4, c), and in this condition they pass the winter. The moths emerge in spring and lay their eggs in broad patches of several hundred each, on the under side of the leaves near the end of a branch, late in May and early in June. The adult insect is usually pure white, but is sometimes white spotted with black. There are either one or two broods of this species, according to the latitude, two in Southern and Central Illinois and probably but one in the northern part of the State.

The simplest and most effective method of controlling these insects is to destroy their webs, and the caterpillars within them, either by cutting off the twigs which bear them and crushing or burning them immediately, or by burning the webs on the tree. A bundle of rags or

a few cornucobs, or even a porous brick, wired to the end of a pole long enough to reach the nest and saturated with kerosene, makes a good torch for the purpose. Care must be taken, however, not to injure the tree, and to destroy the scattering worms which may drop from the nest without being killed. Where the infestation is too general to make this method convenient, or where the webs are so high in the trees that they can not be readily reached, a spray of arsenate of lead will eventually kill the web-worms as they extend their webs over the poisoned foliage. Paris green may be used instead, but the lead arsenate is to be preferred because, being much more adhesive, it lasts longer on the tree. This method is most effective when the caterpillars are young, since they are then extending

their webs rapidly and are likely to be more promptly poisoned than when they are virtually full grown.

THE YELLOW POPLAR-CATERPILLAR.

(*Apatela populi* Riley.)

The prominence of the Carolina poplar as a city tree, especially in situations where it is difficult to find any other which can endure the conditions prevailing, makes it the duty of the entomologist to discuss the insect enemies of even this rather inferior variety.

Among those which have recently been found most injurious to the poplar is a large and rather handsome, light yellow or pale green, very hairy caterpillar (Fig. 5), most easily known by five long pencil-like tufts of black hairs rising one behind the other on the middle line of the back, the first on the fourth segment of the body and the fifth on the last. This caterpillar was particularly injurious to poplars and considerably so to willows in Chicago in 1909. It has been noticed by us also in Peoria, Danville, and East St. Louis. It feeds on the leaves in midsummer and again in fall, there being two generations in a year. It sometimes completely strips a tree, rendering it unsightly and putting it in poor condition to withstand unfavorable conditions or to resist the attacks of more destructive insects.

The caterpillar when full grown is about an inch and a half long, the skin yellowish-green, and the long, soft, drooping hairs yellow. The pencil-like tufts referred to rise from the fourth, sixth, seventh, and eleventh segments, those on the seventh and eighth being the smallest. The head is shining black and there are black spots on the top of segments one and two. The young are almost white, and the black tufts of hairs are shorter, but still conspicuous. The caterpillar is of a sluggish



Fig. 5. The Yellow Poplar-Caterpillar, *Apatela populi*, natural size.

habit, and when at rest it commonly lies curled up, with the ends of the body together. When full grown it spins a loose, pale yellow cocoon of silk interwoven with its own hairs. This is generally placed in a crevice of the bark, under the edge of a fence board, or in some similar sheltered place. The winter is passed in this chrysalis stage, from which a large, pale gray moth emerges the following May.

The caterpillars are most easily destroyed when young, for they do not at first scatter from the branch upon which they were born. Later they can readily be collected singly by hand from trees of small size, or they may be poisoned, like most of the leaf feeders, by spraying with arsenicals when they are active on the tree.

THE WALNUT CATERPILLAR.

(*Datana integerrima* G. & R.)

The most annoying insect enemy of the walnut is a blackish, somewhat striped, hairy caterpillar (Fig. 6), an inch and a half long when full grown, which eats the leaves during the latter part of the summer, often largely denuding the tree. It makes itself particularly offensive on lawns by dropping quantities of refuse from the tree and by crawling over walks and buildings when it comes down to go into the ground.

This caterpillar is readily distinguished by its loose coat of soft whitish hairs, and particularly by its habit of raising both ends of the body



Fig. 6. Walnut Caterpillar, *Datana integerrima*: A, moth; B, pupae. Natural size. (Kentucky Experiment Station.)

when at rest and throwing itself into this position and jerking sidewise when disturbed. It often attracts attention by collecting in masses upon the larger branches or the trunk of the tree preliminary to molting, piling

up in this way two or three layers deep. When full grown it comes down the trunk to the ground, wanders about to a short distance and enters the earth an inch or two, changing there to a reddish-brown or blackish-brown chrysalis (Fig. 6, B). In this stage it winters, emerging the following summer, mainly in June and July, in the form of a buff-brown moth (Fig. 6, A) with darker bands across the fore wings. The females lay their eggs in clusters varying from seventy-five to a hundred, according to some observers, and from five hundred to twelve hundred, according to others, and the young hatching from these feed in dense clusters, completely devouring every leaf as they go. When all the leaves on one twig or branch are destroyed, they migrate to another, sometimes in a distant part of the tree. They lose their gregarious habit as they mature, and by the time they are full grown they scatter here and there over the greater part of the tree. There is but a single generation in a year.

Altho they are most frequently seen on the walnut, they are common on butternuts and hickories, and are a pest to the grower of the pecan. They have likewise been found on beech, oak, willow, honey-locust, apple, and thorn. Trees in the forest are not likely to suffer, but those on streets and lawns are sometimes so completely stripped by September that they stand almost as naked as in midwinter, only the green nuts remaining on the branches.

This account of their habits is sufficient to suggest various available methods of destroying them. On trees small enough to be reached they can be readily killed while young by clipping off the infested twigs on which the caterpillars are grouped in colonies. They are particularly exposed to attack as they assemble in masses for their later molts, when a light spray of kerosene will readily kill them. They are also susceptible to arsenical poisons sprayed upon the leaves, but these must be used in unusual strength. We have found three pounds of arsenate of lead to fifty gallons of water sufficient to kill the full-grown caterpillars. On one occasion a tree nearly fifty feet high was effectively sprayed by the aid of a twenty-eight-foot ladder and a twelve-foot extension rod with a nozzle on the end, about twenty-five gallons of the spray being necessary for a thoro treatment. If these various measures have been neglected and the caterpillars have left the tree, they may still be disposed of in the pupa stage by digging up and working over the ground under the branches and for a little distance outside, to a depth of three or four inches.

THE WHITE-MARKED TUSSOCK-MOTH.
(*Hemerocampa leucostigma* S. & A.)

The most destructive leaf-eater infesting shade trees in the larger cities of Illinois and especially in Chicago is the caterpillar of the white-marked tussock-moth. It often completely defoliates large trees, those most seriously injured being the elm, the soft maple, the linden, the birch, and the horse-chestnut. (Fig. 7.) Almost every kind of tree, excepting conifers, is subject to its attack, and it sometimes becomes decidedly injurious in orchards. In Chicago it has been noted as injurious to apple, box elder, hard maple, Norway maple, poplar, willow, oak, ash, locust, hickory, catalpa, and sycamore, and to several shrubs, including dogwood, buttonbush, *Viburnum*, and bladdernut (*Ptelea*). In September and October, 1910, it was found in every one of eighteen towns visited by Mr. John J. Davis, present in small numbers in seven of them, common in nine, and in destructive numbers in two.

This is a well-marked insect, very easily recognized, especially the caterpillar and the egg mass—the two conditions against which measures of destruction must be taken. The hairy caterpillar (Fig. 8), bright yellow in general color and striped with black, and about an inch and a half long when full grown, is a really beautiful object. It may be known by its coral-red head, by two plumelike tufts of long black hairs projecting upward and forward from the back near the head, by a single similar tuft at the hind end of the body, and especially by four thick, short, brushlike clusters of

cream-colored hairs arranged, one behind the other, in front of the center of the back. In this condition it may be found upon infested trees in June, July, and August.

There are two generations of the caterpillar in a year in Northern Illinois, possibly three farther south. The egg masses (Fig. 9) from which the caterpillars hatch may be found in fall, winter, and early spring. They form, when first deposited, frothy, oval, snowy white patches about an inch in length, on the tree trunks, in the crotches of the larger branches,



Fig. 7. Linden tree in a park in Chicago, defoliated by larvæ of White-marked Tussock-moth (*Hemerocampa leucostigma*). The few leaves on the tree have all appeared since the defoliation.

or in other more or less sheltered places, such as the edges of weather-boards and the under sides of the eaves of porches. Conspicuous objects at first, their color, under exposure to the sooty air of Illinois towns, is soon deadened to a dirty gray. The caterpillar begins to hatch from the over-wintering egg masses about the middle of June in Chicago (June 18 in 1909) and gets its growth in about a month. Feeding at first on the under side of the leaf, which it skeletonizes by eating off the soft tissue,

it later eats inward from the edge of the leaf, devouring everything except the principal veins.

The young caterpillars drop down, hanging by silken threads, when the tree is jarred, and sometimes spin down without being disturbed, when they may be blown to a considerable distance by the wind. When nearly full grown, they are great travelers, going from tree to tree and even moving in large numbers from a defoliated tree to others near by. When full grown, the caterpillar spins, on the tree, a delicate grayish cocoon of silken web mixed with its own long hairs. It changes to a pupa within a few hours after the cocoon is finished and continues in this condition from ten days to two weeks.

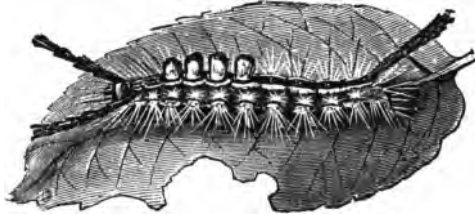


Fig. 8. White-marked Tussock-moth, *Hemerocampa leucostigma*, larva. Natural size.

The adults are moths, the females (Fig. 10) of which differ very widely from the males (Fig 11) in the fact that they are almost absolutely wing-



Fig. 9. White-marked Tussock-moth, *Hemerocampa leucostigma*, cocoons and egg masses on tree trunk in a park in Chicago.

less. The males have good wings and at least the average power of flight. They are of an ashy gray color, with dark wavy bands across the fore

wings, a small black spot on the outer edge near the tip, a blackish stripe beyond this, and a minute white crescent near the hind angle. The wings, when expanded, measure about one and a fourth inches across. The female has little of the appearance of a moth, her wings being reduced to the merest rudiments. Her thick, oblong-oval body is of a light gray color, with rather long legs, and is distended with eggs. When she comes out she lays her egg mass on the cocoon from which she emerged—a fact which makes it plain that the species can spread only by way of the wandering caterpillars, or by the transportation of egg masses on young trees. The eggs of the last generation are ordinarily produced in September and the winter is passed in this condition.

Many insect parasites infest the pupa and do much towards holding the species in check. They are not usually abundant enough, however, to control it completely. In the fall of 1907, for example, one of my assistants reported that 75 per cent of the cocoons of the tussock-moth in the Chicago parks were parasitized, but the caterpillars were nevertheless very numerous and destructive the following year. Birds eat them, but not freely enough in the larger cities to reduce their numbers materially.



Fig. 10. White-marked Tussock-moth, *Hemerocampa leucostigma*, female and egg masses. Natural size. (Connecticut Experiment Station.)



Fig. 11. White-marked Tussock-moth, *Hemerocampa leucostigma*, male. Natural size.

Three measures of destruction are applicable to this pest and sufficient for its control. These are the destruction of the egg masses in winter, banding trunks of uninfested trees in spring, and spraying infested trees in summer. The trunks and larger branches of trees, as well as all objects surrounding those infested the season before, should be carefully examined in winter and spring for egg masses, and all these within reach should be scraped or cut away and burned or otherwise destroyed. Those beyond convenient reach may be killed in place by touching each egg mass with a sponge or brush attached to the end of a long pole and dipped in crude creosote.

As the insect spreads from tree to tree only in the caterpillar stage, an uninfested tree may usually be protected completely by banding the trunk in such a way that the caterpillars from adjacent trees can not climb beyond the band. Sometimes, however, the branches of trees intermingle or touch in such a way that the caterpillars may go from one tree to the other without coming down to the ground. These bands should be applied to the tree soon after the caterpillars begin to appear in spring, and they should be renewed from time to time as they are made useless by exposure to the weather.

Either one of two kinds of bands may be used. The trunk may be surrounded, at a convenient height, by a belt nine inches wide of what

is known as tree tanglefoot, applied with a brush; or bands of cotton batting about four inches wide may be tied closely about the tree by a string passed around the middle of the band, the upper half of which should then be turned down over it.

Where the preceding measures have been neglected and trees are being defoliated, the injury may be stopped by spraying with Paris green or arsenate of lead. This, however, is a difficult and somewhat expensive operation with large trees, and may be rendered unnecessary by destroying the egg masses and banding the trees as above described.

THE BROWN-TAIL AND GYPSY MOTHS.

(*Euproctis chrysorrhoea* Linn. and *Porthetria dispar* Linn.)

These two frightful insect pests, altho present in America, the first for about forty years and the second for nearly half as long, have neither of them become established in Illinois, or indeed made any permanent appearance outside of New England. It will probably be long before the



Fig. 12. Brown-tail Moth, *Euproctis chrysorrhoea*, winter nests. Natural size. (Connecticut Experiment Station.)

gypsy moth becomes an inhabitant of this State, its powers of migration being limited to the larva. The female, altho well provided with wings, has a very heavy body, and does not fly. The brown-tail moth, on the other hand, is a strong, swift flier, and is virtually certain to occupy the whole country in due time, and it is further particularly likely to be introduced into the State direct from its European habitat on nursery stock imported from France. It winters, in the caterpillar stage, partly grown, hundreds of young collect in single colonies on the trees, where they hibernate in closely webbed nests (Fig. 12). Hundreds of these nests containing living young were sent, in 1909, into Illinois from France, and only the most active and fortunate inspection work prevented their escape in this State that winter. Worse than this, however, infested cases of nursery stock originating in France were reshipped into Illinois from other states where the force of inspectors was not sufficient to deal with the shipments arriving, and danger from these sources will continue year after

year unless other states strengthen their inspection systems. Furthermore, since stock received in Iowa was shipped to this State that winter bearing living brown-tail caterpillars, it is extremely likely that the part retained in Iowa was similarly infested and that the brown-tail has thus obtained a lodgment there and possibly in other states adjacent to Illinois. If this is the case it will presently spread to our State also, especially as the moth flies long distances before the prevailing winds. It is important, for these reasons, that our people should be fully informed and carefully instructed in advance in order that the first of these insects to appear may be detected and destroyed without delay.

The brown-tail moth is a caterpillar (Fig. 13) in the destructive stage, and, of course, goes thru the four stages of egg, larva, pupa, and adult. It is easily distinguished in the last of these stages from any American insect by the character to which it owes its name of "brown-tail," namely, a thick brushlike tuft of orange-brown hairs at the tip of the abdomen, especially in the female (Fig. 14). Otherwise both sexes are pure white thruout, except that occasionally there may be a few black spots on the fore wing of the male. They measure about an inch and a quarter from



Fig. 13. Brown-tail Moth, *Euproctis chrysorrhoea*, larva. Natural size. (Massachusetts Experiment Station.)

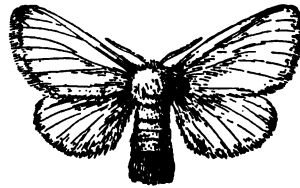


Fig. 14. Brown-tail Moth, *Euproctis chrysorrhoea*. Slightly enlarged. (Massachusetts Experiment Station.)

tip to tip of the expanded wings. Any pure white moth of approximately this size with an orange-brown tuft of hairs at the tip of the abdomen may be at once set down as the brown-tail; and any one seeing it in Illinois will render a notable public service by reporting the fact promptly to the State Entomologist, at Urbana, Ill.

The winter nests of these caterpillars are also easily identified, since no native Illinois species hibernates on either tree or shrub in colonies of living caterpillars inclosed in a web. Any such cluster of young caterpillars so protected by a common web may consequently be set down at once as the brown-tail and should, of course, be promptly destroyed and the facts reported to the Entomologist. Nurserymen importing European seedling stock can not guard too carefully against the accidental importation of this insect pest, as it is widespread in Europe, breeding abundantly on hedges, trees, and various shrubs, and making its way into the nursery from infested surroundings.

The brown-tail feeds upon practically all deciduous trees and many shrubs and even upon herbs. Thousands of fruit trees in the vicinity of

Boston have been killed by it, and damage to maples and elms in wooded regions has caused the forest to appear brown in June, an injury which, if repeated for three or four years, has killed many trees. As the caterpillars pass the winter about a quarter grown, they begin to devour the leaves of trees as soon as these put out in spring, and even eat the buds and blossoms before the leaves have spread. Old trees may thus lose all their buds, or, if not, the foliage itself may be devoured at a later date.

The caterpillar reaches its full size in New England during the last half of June, and the moths emerging, fly about and lay their eggs some twenty days later. The small round eggs are laid in brownish masses (Fig. 15) on the under side of leaves, each mass two-thirds of an inch long by a fourth of an inch wide, and containing about three hundred eggs. The full-grown caterpillar is about two inches long, reddish-brown, with an interrupted white stripe on each side and two red dots on the back near the hind end. It is also blotched with orange and is covered with tubercles bearing long barbed hairs, those on the back and sides with short brown hairs additional, which give them, when magnified, a velvetlike look. The young hibernating larvae are blackish, with reddish-black hairs and black heads. The pupa is formed among the leaves on the infested tree or shrub, most frequently at the tips of the branches, where several caterpillars may spin a loose web together, each forming however, its own cocoon within the web. When the insect becomes abundant, cocoons may be found under fences and at the edge of clapboards on houses, and in many similar places.

One of the most disturbing peculiarities of a brown-tail infestation is the fact that the long barbed hairs already mentioned are covered with a poisonous excretion, and that they readily pierce the skin, causing an irritating rash which occasionally results in serious illness. "Indeed," says Dr. Howard, "it is not necessary for the caterpillar itself to come in contact with the skin; at certain times of the year it seems as though the hairs were actually floating about in the air. At the time of the caterpillar's change of skin, and particularly at the time of the spinning of the cocoon and the final change, certain of these hairs appear to become loosened in such a way that they are carried by the wind." Others report that these poisoned hairs may collect on clothing hanging on the line, to the intense annoyance of those who wear it.

The readiest and most obvious means of controlling the brown-tail moth, and certainly the easiest one, is the collection and destruction of the winter nests after the leaves have fallen. After April the only practical remedy is spraying the trees with an arsenical mixture. The young caterpillars are readily enough destroyed with arsenate of lead, but the older ones become resistant to poison sprays, and as much as five pounds of the arsenate to a barrel of water has been found necessary to kill the full-grown caterpillar.

When this insect appears within our borders it will be most destructive in parks and towns and forest plantations, since these are not regularly sprayed and will require a special treatment to protect them. It will also aid the San Jose scale in putting out of business the neglectful or indifferent orchardist, but the business fruit grower, who values his property and takes care of it as well as he can, will have much less to fear from this insect, since his ordinary spraying operations will be practically certain to destroy it as it enters his orchard. The fact, however, that the full-grown caterpillar



Fig. 15. Brown-tail moth. *Eu-proctis chrysorrhoea*, egg masses on leaves. Natural size. (Connecticut Experiment Station.)

requires a heavier insecticide treatment than does the codling-moth and the canker-worm, for which most of our spraying is done, may make it necessary to go over the orchard in winter to remove and destroy the hibernating colonies.

The gypsy moth may be more briefly considered, altho it is even a more destructive pest than the brown-tail, especially for the reason that it eats the leaves of evergreens—trees which are often killed by a single defoliation. It is conveyed to distances in the caterpillar stage only by accident. Passing wagons, automobiles, trolley cars, or even railroad trains, may carry the caterpillars to uninfested districts, but in this way its spread is slow, especially as all possible measures are being taken in infested districts of New England to keep the roadsides free from the pest, and thus to reduce to a minimum the possibility of an extensive spread.

The caterpillar of the gypsy moth (Fig. 16) is a voracious feeder, eating the leaves of nearly every kind of tree or shrub, and devouring sometimes

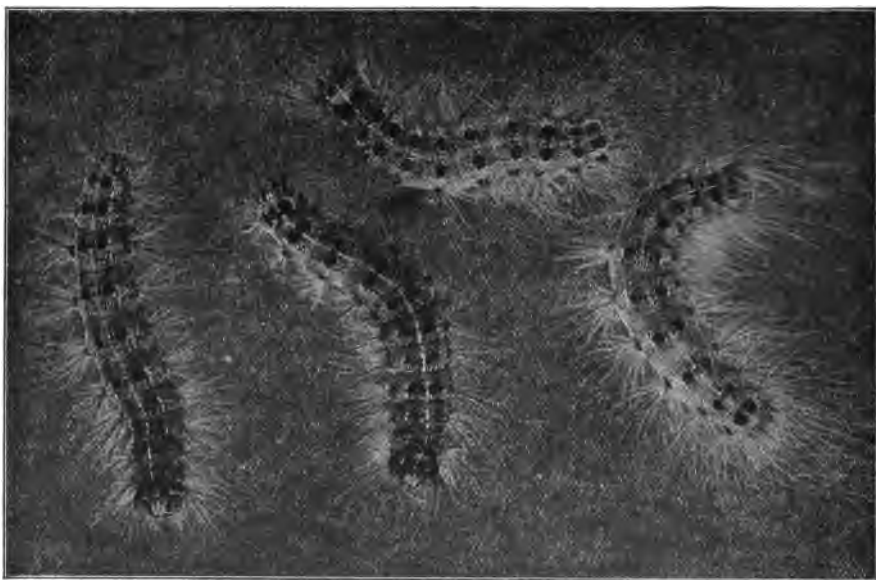


Fig. 16. Gypsy Moth, *Porthetria dispar* larvæ. Natural size. (Connecticut Experiment Station.)

also grasses and field and garden crops. The very fact that it spreads but slowly makes it locally all the more injurious, since it accumulates in enormous numbers upon infested localities. Forests, orchards, gardens, parks, and street shrubs and trees may be stripped of every leaf between the first of May and the middle of July.

The insect winters in the egg stage, the eggs being plastered in conspicuous masses (Fig. 17) on the trunks of trees and on various other objects. They may readily be destroyed by touching them with a mixture of creosote oil, 50 per cent, carbolic acid, 20 per cent turpentine, 20 per cent, and coal-tar, 10 per cent, in sufficient quantity to soak the mass. The caterpillar may also be killed on the trees with arsenical poisons, but these must be applied in unusual quantities, since the gypsy moth is not readily poisoned in the caterpillar stage. Five pounds of arsenate of lead to fifty gallons of water will kill the young, but even this can not be depended upon for the full-grown caterpillars. These are about three inches long, of a sooty or

dark gray color. Along the back is a double row of blue spots, followed by a double row of red spots, and the back is marked with yellow. The cocoon is formed among the leaves like that of the brown-tail and the moths appear from the middle of July to the middle of August. The male is bluish-yellow, expanding about an inch and a half, and the female (Fig. 17) is nearly white, somewhat spotted and barred with black. Its wing expanse is about two and a fourth inches. The female is very sluggish and so heavy that she can not fly; but the male is an active flier.

The oval egg masses, about one and a half inches long by three-fourths that in width, are laid in summer on the trunks of trees, on fences, on the sides of houses, and in various other places. Large holes in old trees are often found filled with them. The caterpillars feed principally at night, especially after they reach some size, and they seek to hide during the day, often coming down upon the larger limbs and trunk of the infested tree in



Fig. 17. Gypsy Moth, *Porthetria dispar*; female moths, laying eggs on bark. Natural size. (Connecticut Experiment Station.)

search of hiding places. This habit has led to the use of bands of burlap tied around the trunks of trees, under which the caterpillars may rest during the day and where they can be easily destroyed by hand.

The probabilities of widespread destruction to forest, park, and orchard properties by these insects are greatly reduced by the truly tremendous and unexampled work being done by the United States Department of Agriculture and the state of Massachusetts in bringing from Europe the native parasites of these insects. This work is making successful progress, and it is all the more hopeful because the parasites of both these species seem to keep them substantially in check in the Old World, where they rarely become seriously destructive.

THE FOREST TENT CATERPILLAR.

(*Malacosoma disstria* Hbn.)

There occasionally appears in the forest region of southern Illinois an overwhelming eruption of caterpillars which denude large areas of wood-

lands, especially the oaks and the maples, and the black and sweet gum trees, and thence invade orchards, parks, and town premises, carrying the same destruction to fruit and shade trees generally. This is one of the species which moves in masses such as actually to delay the passage of railroad trains, piling up on the rails several inches deep. It is known to entomologists as the forest tent caterpillar, but in the South it is commonly called "the caterpillar" simply. The name of "tent caterpillar" is, in fact, inappropriate for it, since it spins but little and never makes a tent. It is closely allied, however, to the common tent-caterpillar of eastern orchards and has received its common name because of this resemblance.



Fig. 18. Baltimore Oriole attacking nest of Forest Tent Caterpillar, *Malacosoma disstria*. (New Hampshire Experiment Station.)

When full grown (Fig. 19) it is about two inches long and a quarter of an inch thick. It is of a brownish general color, and is conspicuously marked with a series of whitish or cream-colored spots down the middle of the back. On the upper part of each side is a rather broad blue line edged above and below with a yellowish-brown line. When disturbed it drops from the branch and hangs suspended in mid-air by means of a fine thread spun

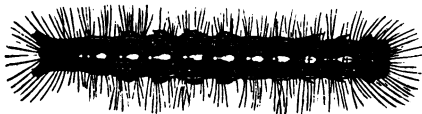


Fig. 19. Forest Tent Caterpillar, *Malacosoma disstria*, larva. Natural size.

from the mouth. In moving about on the tree these caterpillars follow each other in single file. They feed mostly in the tops of the trees, often eating out the central part of the base of a leaf, allowing the remainder to fall to

the ground. When preparing to molt, they mass together on the limbs and may continue thus for a day or two. They often form similar masses in stormy weather and in general when at rest. The eggs (Fig. 20) are laid in a thick hard band around a twig and covered with an impervious varnish. From these the young hatch in early spring, sometimes before the appearance of the leaves on which they depend for food. They are capable, however, of fasting for a considerable time without injury, and they may even survive the destruction of the leaves by late frosts. They scatter for pupation late in May or early in June, spinning cocoons which they fasten among clusters of leaves or exposed on fences and in other similar situations. There is but a single generation in a year. The parent moths (Fig. 21) measure about an inch and a quarter across the expanded wings. The general color is brownish-yellow and the fore wings are marked by two straight dark brown lines which cross them obliquely, parallel with each other and the hinder edge.

Trees may be protected by spraying with arsenical poisons shortly after the young caterpillars begin to appear, or by clipping off in winter the twigs bearing the conspicuous belts of eggs and destroying these by burning. Even overwhelming hordes may be arrested by surrounding the tree trunk with a band of cotton batting about four inches wide, tied around the



Fig. 20. Forest Tent Caterpillar, *Malacosoma disstria*: e, egg ring recently laid; g, hatched egg ring. Slightly enlarged. (Cornell Experiment Station.)



Fig. 21. Forest Tent Caterpillar, *Malacosoma disstria*: m, male; f, female. Natural size. (Cornell Experiment Station.)

middle with a string, the upper part being then turned downward over the string. Or the trunk may be surrounded with a band of printers' ink applied as described in the article concerning the common canker-worm.

THE COMMON CANKER-WORM, OR SPRING CANKER-WORM. (*Paleacrita vernata* Peck.)

The common canker-worm is best known as a pest of the apple orchard, but it is sometimes even more destructive to elms (Fig. 22) than to apple-trees. It feeds also on cherry, at first eating small holes thru the leaves, but when larger devouring the whole leaf except the midrib and some of the coarser veins. Modern methods of orchard management require a regular and frequent spraying with arsenical poisons as a protection of fruit against the codling-moth, and this has the incidental effect—often unnoticed by the orchardist—of speedily killing off any colony of canker-worms which may have chanced to make a start in the orchard. Hence it is only neglected orchards, or those not in bearing either because too young or by reason of a crop failure for the year, which are liable to serious canker-worm injury.

With the elm, however, the case is different. The canker-worm lives on this tree as willingly and successfully as on the apple. Elms are rarely sprayed in Illinois, and if the canker-worm once comes to infest them there is no natural end to the injury except the death of the tree,

unless, indeed, the parasites of the insect and other natural checks on its increase may happily suppress it before that event.

The spraying of large elms is, of course, a difficult and expensive operation, and canker-worms are less susceptible to arsenical poisons than many other insects. There is, however, a much cheaper and more convenient method of protecting the elm, by which advantage is taken of two features in the economy of the insect. When the caterpillars are full grown they leave the tree to pupate in the earth, and the female moth emerging, being wholly without wings, can only reach the tree to lay her eggs by climbing up the trunk. If this is encircled at the proper time by a sticky band impassable by her or young canker-worms just hatched from the egg, the tree is virtually secure against canker-worm injury except as worms may reach it from neglected trees with which its own branches interlace.

Altho the female canker-worm (Fig. 23, b) is wingless, the male (Fig. 23, a) has two pairs of rather large, thin, ashy or brownish-gray



Fig. 22. Injury to elms at Calamus Lake, Niantic, Illinois, by common Canker-worm (*Paleacrita vernata*.)

wings, the first pair with a broken whitish band near the outer edge and three interrupted brownish lines between that and the body. There is also a short oblique black mark near the tip of the wing, and a black line at its edge at the base of a fringe of hairs. The eggs (Fig. 24, b) are about .03 of an inch long, oval in outline, and of a pearly luster at first, changing to yellowish-green with a golden, greenish, or purplish iridescence. They are laid in irregular masses, often as many as a hundred together, and usually hidden in crevices of the bark of trees.

The female comes out of the ground to lay her eggs from February to April, the date varying with the latitude and the season. The young caterpillars appear about the time that the apple-tree unfolds its leaves, commonly, in this state, in April or early May, and they usually get their growth in about a month from the time when they issue from the eggs. They then go into the ground to a depth of two to five inches, each one in a small cell, where they change to the chrysalis, remaining there until the following winter or early spring, when the change to the adult insect

takes place. There is thus but a single generation produced each year. The canker-worm is widely distributed thruout the country and may occur in destructive numbers in any part of Illinois. Its feeble power of locomotion prevents its rapid spread in any locality, but by concentration of its injuries it is the more destructive where it does occur.

In its injurious or caterpillar stage (Fig. 24, a) it is readily recognized. It has a long and slender form and the habit of a "looper" or measuring worm. When not eating it usually adheres only by its hinder prolegs, extending the body from this point of support at an angle of about 45 degrees. As it is colored much like the bark of a tree, it then has the appearance of a stubbed twig. It also has the habit of spinning down from the tree at the end of a thread, particularly if the branch is jarred or shaken. Both the just-mentioned habits are doubtless advantageous to it; the first by concealing it to some degree from the observation of birds and the second by putting it beyond their reach. The full-grown canker-worm is about nine-tenths of an inch in length and may vary from greenish-yellow or gray to dusky or even dark brown, with paler stripes along the sides. A close examination will show also two light lines running close together along the middle of the back. The young are usually olive-green. The wingless female, with its small gray body from a quarter to two-fifths of an inch in length and its rather long legs, gives more the impression of a spider than that of a moth. The chrysalis is pale grayish-brown, with a dark green tinge on the wing sheaths, and measures about a third of an inch in length.



Fig. 23. Common Canker-worm, *Paleacrita vernata*: a, adult male; b, female; c, portion of female antenna; d, joint of abdomen, enlarged; e, ovipositor.

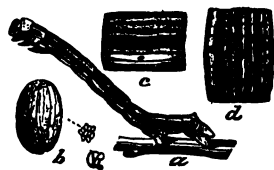


Fig. 24. Common Canker-worm, *Paleacrita vernata*: a, larva; b, cluster of eggs, natural size, with one enlarged; c, side view of one of the segments; d, back view of same, both enlarged.

This insect has not recently been abundant in Chicago, but its capacities for injury are well illustrated in a recent attack on elms at Big Rock, Kane County. Some ten years ago it was generally prevalent thruout the south-central part of the State, both in towns and in forests, to which it had apparently escaped from neglected orchards, although in some cases orchards were invaded in turn from adjacent forests. A most threatening attack was made on the magnificent old elms of Jacksonville, but a vigorous campaign, first of spraying and later of the application of adhesive bands, presently brought the outbreak under control.¹

A cheap and available band for the trunk of a tree is made by laying around the trunk first a strip of unglazed cotton batting two or three inches wide and over this a four- to six-inch strip of tarred paper tied around the middle with ordinary wrapping twine. Upon this paper belt should be spread a layer a quarter of an inch thick of cheap printers' ink with which a small amount of car wheel oil has been mixed, just enough to make it easy to spread. If the tarred belt becomes slightly hardened by exposure so as to permit an insect to cross, it may be made sticky again by brushing it with a little of the same kind of oil. The cotton batting beneath the paper is necessary to keep the young canker-worms or the female moths from crawling up behind the paper where the roughness of the bark would give them passageway. These bands should be placed on the tree as early as the middle of February or the first of March, the time varying according to the

¹ The Canker-worm on Shade and Forest Trees. By S. A. Forbes. Twenty-second Report State Ent. Ill., page 139.

latitude, and they may be safely removed by the middle of June. The cost of the bands will approximate ten cents a tree.

If the canker-worms have already ascended the tree, it is sometimes necessary to spray the leaves with an arsenical poison, which may be either arsenate of lead or Paris green, the latter at the rate of one pound of the poison and one pound of lime to seventy-five gallons of water. If the arsenate of lead is used, three pounds of it dissolved in fifty gallons of water will kill even the full-grown caterpillars.



Fig. 25. Trunk of ash in one of the parks in Chicago, showing injury by the Lilac Borer, *Podosesia syringae*.

THE LILAC BORER.

(*Podosesia syringae* Harris.)

Among the borers whose instincts lead the female to choose, for the deposit of her eggs, scars or injured places on the bark of trees and shrubs, with the effect greatly to increase the injury and to prevent its healing, is a species commonly known as the lilac borer (*Podosesia syringae*), because it was first noticed to infest lilacs. It is much more important, however, by reason of its injuries to various species of true ashes,¹ and to the mountain

¹ It has been found injurious to the lilac (*Syringa* sp.), to the mountain ash (*Sorbus americana*), and to the white, green and English ashes (*Fraxinus americana*, *lanceolata*, and *excelsior*).

ash, on the trunks and branches of which it produces large, rough, scarlike outgrowths from knots, roughened places, or wounds, by undermining the bark and boring into the wood. (See figures 25 and 26.)

The eggs are laid in summer in masses on rough, scarred, or knotty places. They hatch in about six days and the young borers eat thru the bark into the outer layers of the sapwood, where they mine irregularly about, penetrating the harder wood and going to the center of small branches. (Fig. 27.) In fall, when they are nearly or quite full grown, they make a hibernating cell by plugging up the burrow both before and behind with frass, and



Fig. 26. Trunk of ash, in one of the parks in Chicago, showing injury by the Lilac Borer, *Podosesia syringae*.

there they pass the winter as larvae. They do practically no burrowing in spring, but pupate in April or the first part of May. As a preparation for pupation, they burrow outward and cut their way thru the bark, leaving only a thin outer film to close the pupal cavity. By means of short teeth with which each segment of the abdomen is armed, the pupa, when mature, works its way out of its gallery until it projects some three-quarters of an inch. The winged insects, altho moths, closely resemble wasps in movement, color,

and form. They make their appearance from the latter part of April to the middle of June in central and northern Illinois.

The borer or larva (Fig. 28) is very variable in length. It is white, yellowish anteriorly, the head of a bright mahogany color, becoming very dark at the mandibles, which are stout, broad, and provided with five teeth. The segments of the body are distinctly marked, somewhat flattened, the first segment reddish and leathery above, the last with a broad yellowish patch.

The moth (Fig. 29) has a black head, a deep brown thorax more or less marked with bright chestnut-red, and a black abdomen sometimes marked



Fig. 27. Lilac Borer, *Podoseia syringae*. Burrows in ash made by larvæ. Slightly reduced.



Fig. 28. Lilac Borer, *Podoseia syringae*, larvæ. About 5 times natural size.

with chestnut, but sometimes with a small yellow spot on each side of the fourth segment, or with the segments banded with yellow. The femora are black, the anterior pair of the tibiæ orange, the middle and hind tibiæ black with orange bands. The tarsi are yellow, the hind pair with a black band above. The fore wings are deep brown, with a violaceous luster and usually with a rusty red dash on the outer part. At the base is a transparent streak. The hind wings are transparent and yellowish, the veins, discal marks, and margins deep brown, sometimes tinged with red.

The spread of the wings is from an inch to nearly an inch and a half, the females being considerably larger than the males.

This insect is very abundant and destructive, especially to the green ash in Chicago parks, and has been bred by us also from the white ash at Kankakee. Its injury is very noticeable and characteristic, especially on the trunks of small trees. Sometimes the smaller branches break off at the point of injury, but this does not usually happen until after the moth has escaped. George D. Hulst says, writing of these insects in New York: "In this section they are very destructive to both lilac and English ash. Large shrubs of lilac are now very rarely seen, and the English ash is being rapidly exterminated. In the latter I have seen the wood completely riddled with the holes made by the larvæ and the entire tree dead."

To check the multiplication of the species and the spread of the injury it will be sufficient to cut away and burn infested branches and trees in winter. It may also be practicable to protect trees especially exposed by painting rough, knotty, and injured places on the bark with a poison mixture commonly used by orchardists to prevent infestation by ordinary borers. A number of substances are available for this purpose, the simplest of which, perhaps, is a mixture of soft soap and soda, with the addition of Paris green. The following is a convenient formula: To a saturated solution of washing soda add soft soap sufficient to make a thick paint, and to each ten gallons of this wash add a pint of crude carbolic acid and half a pound of Paris green. This may be painted thickly upon scarred, roughened, or knotty surfaces, in April and early May and renewed as necessary until August.

TWO POPLAR BORERS.

(*Memythrus tricinctus* Harris.)
(*M. dollii* Neum.)

Two boring caterpillars, similar in appearance, but differing in the larval or boring stage mainly in size, infest poplars in this State to an injurious degree. They are most destructive to young nursery trees, particularly to the balm of Gilead (*Populus candicans*), but the Carolina poplar (*P. deltoides*), Figure 30, is also sometimes badly infested. They are generally present thruout Chicago, often infesting trees which are likewise injured by a boring larva, *Cryptorhynchus lapathi*, discussed on page 274. They have been found by us in park and street trees in several Illinois cities and towns from Centralia northward. In the case observed by us in Chicago, the eggs of one of these species, which one we do not know, were deposited July 22, mostly in a crevice of the bark or in the neighborhood of a bud, and young larvae were first seen July 26, altho some of these had apparently hatched at least a week before. The borers winter in the larval stage in the wood, pupate in spring, and come out as winged moths in June and July—at various dates from June 18 to July 26, if we may judge by results obtained in our insectary. From a willow in Cook County a specimen of *M. tricinctus* was bred which emerged July 2.

The boring larvæ are whitish caterpillars, with brown or yellowish heads and a smooth neck shield. The two species are most easily distinguished by the markings of the head and by the number of hooks on the abdominal legs. In *M. tricinctus* the head is yellowish and mottled with large patches of brown, while the abdominal feet have from eighteen to twenty-two hooks in a row. In *M. dollii* (Fig. 32) the head is brown with large darker patches on the sides, and a black band or blotch between the antennæ. The abdominal feet have ten to fifteen hooks in each row. Both



Fig. 29. Lilac Borer, *Podosesia syringae*, adult. Slightly enlarged.

these species are distinguished from some other borers of their family by the fact that the first segment of the thorax bears two oblique dark marks, approaching each other behind.

The winged insects are readily distinguished by a comparison of the wings and abdomens. In *tricinctus* (Fig. 35) the fore wings are violaceous-black, the hind wings are transparent, and the abdomen is black with three or four yellow bands. In *dollii* (Fig. 36) the fore wings are brown, the hind wings are brown and opaque, except at the base, and the abdomen is brown, sometimes with one or more yellow bands.



Fig. 30. Small poplar infested with sesiid borers (*Memythus*.)

In our work with these borers it was not at first known that two species were concerned, and the larvæ were not distinguished in our notes. It was only when the adults appeared that the specific distinctions were established.

A third species, allied to the two above mentioned, but more commonly found infesting ninebark (*Opulaster opulifolius*), has been once bred by us from poplar at Chicago.

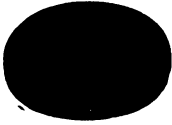


Fig. 31. Poplar Borer, *Memythrus tricinctus* or *dollii*, egg. Greatly enlarged.



Fig. 32. Poplar Borer, *Memythrus dollii*, larva. About 3 times natural size.



Fig. 33. Poplar Borer, *Memythrus tricinctus* or *M. dollii*, pupa. About 3 times natural size.



Fig. 34. Poplar Borer, *Memythrus tricinctus* or *M. dollii*, anal end of pupa. Greatly enlarged.

A VIBURNUM BORER.

(*Sesia pictipes* G. & R.)

A boring caterpillar, somewhat larger than that described from ninebark and dogwood, but otherwise extremely similar, has been found doing considerable damage to viburnum shrubs in all the parks of Chicago, and, in one case, to wild black cherry at Riverside. It burrows beneath the bark, frequently killing the branches. It spends the winter in the larval stage, and has emerged in our breeding cages during the latter part of June, from the twentieth to the twenty-fourth. Elsewhere it is reported to emerge during June and July. The species is known also from plum, cherry, beach-plum, peach, Juneberry, and chestnut, and has been bred from the blackknot of the plum.



Fig. 35. Poplar Borer, *Memythrus tricinctus*, adult female. About twice natural size.

The placing of the eggs has not been noticed by us, but another observer, Dr. Bailey, found a cluster of them, ninety-two in number, on the under surface of loosened bark a few inches from the root of a badly infested plum-tree.

The removal and destruction of infested branches at the proper time of the year, that is, during the winter and spring, is the only measure practicable for the control of this pest.

The winged insect has a blue-black head, thorax, and abdomen, the thorax with a narrow pale line each side, and the abdomen with a narrow pale yellow ring on the second and fourth segments, encircling the body completely on the latter. The fore wings are transparent, with very narrow blue-black

margins, and a narrow, straight, discal mark. The inner margin is sometimes scaled with pale yellow. The hind wings are transparent, with a very narrow outer margin and no discal mark. The spread of the wings is from 15—26 mm., the smaller specimens being males.



Fig. 36. Poplar Borer, *Memythrus dollii*, adult. About twice natural size.

THE MAPLE BORER.
(*Sesia acerni* Clem.)

The worst of the borers of the maples, both hard and soft, very common and destructive to soft maples in Chicago, and common also in towns throughout the State, is a white or nearly white caterpillar (Fig. 37, *a*) about half

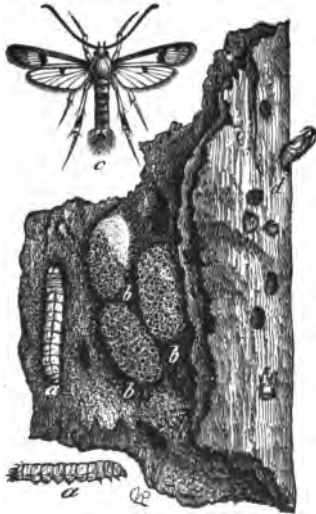


Fig. 37. Maple Borer, *Sesia acerni*;
a, *a*, larvæ; *b*, *b*, *b*, cocoons; *c*, adult;
d, pupal skin left in mouth of burrow.

an inch long when full grown, with a yellow head and a neck shield of a paler tint. It is especially injurious to young trees, but usually originates in some surface injury which attracts the parent moth in search of a place of deposit for her eggs. It burrows mainly just beneath the bark, where it can be found and destroyed in fall or early spring. It comes to maturity in May or June, eats its way nearly thru the bark, and pupates there. We collected the adult in considerable numbers, at electric lights, in Urbana, from May 18 to June 3, 1887. When ready for its transformation the pupa wriggles partly out of its burrow, and the adult insect escaping leaves the empty pupa-case still sticking in the opening, which is about an eighth of an inch across. (Fig. 37, *d*.)

The adult is a handsome wasplike moth (Fig. 37, *c*; Fig. 38) with thin transparent wings, a slender yellow body banded and trimmed with red, and a brushlike tuft of hairs at the tip of the abdomen. The eggs are laid chiefly in rough or injured places, almost wholly in the trunk of the tree, and not in its branches. The effect of the injury is to kill the bark undermined, and to enlarge surface wounds and prevent their healing, converting them into permanent, rough, and very unsightly scars. Sometimes the tree is killed by a girdling of the trunk.

To prevent attack by these borers the tree should be protected from injury, and such wounds as it receives should be painted over or covered with grafting wax. Dr. Felt, State Entomologist of New York, says that "the deposition of eggs could probably be prevented to considerable extent

by treating the trunks of trees about the middle of May with a wash prepared as follows: Thin one gallon of soft soap with an equal amount of hot water and stir in one pint of crude carbolic acid (one-half pint, refined), let it set over night and then add eight gallons of soft water. Apply thor-



Fig. 38. Maple Borer, *Sesia acerna*, adult. About 3 times natural size.

oughly to the trunk, especially about all crevices and wounds, from the ground to about six or eight feet high, and renew if necessary before the middle of June." As the borers work near the surface, they can be easily dug out and destroyed in fall.



Fig. 39. Ninebark Borer, *Sesia scitula* larva. About 3 times natural size.

THE NINEBARK BORER. (*Sesia scitula* Harris.)

Dogwood and ninebark shrubs (*Cornus* sp. and *Opulaster opulifolius*) in the Chicago parks are generally infested, and often seriously injured, by a boring or girdling caterpillar (Fig. 39) which works just beneath the bark, mainly at the junction of the branches or in the neighborhood of an old dormant bud. The burrows of the borer sometimes extend lengthwise of the branch, and sometimes girdle it near its origin. In 1908 nearly every shrub of the ninebark in Washington Park was infested, and many of the branches were killed by this larva. The species also infests the chestnut, and has been bred from galls on twigs of the oak.



The creamy white larva, half an inch long in September, passes the winter in its burrows, and emerges, according to our observations, in late June or in July. The head is brown, darkening almost to black towards

Fig. 40. Ninebark Borer, *Sesia scitula*, adult female. About 3 times natural size.

the mandibles. The prothorax is slightly brownish, with two oblique brown markings on its posterior half. The remaining segments are creamy white, except the last, which is pale reddish-brown.

The winged insect (Fig. 40) is deep blue-black on the thorax and abdomen, the former with a yellow line and a yellow patch on each side, and the latter with a yellow line at its base and, in the male, a narrow yellow ring on the second and fourth segments, broadening below on the fourth to cover the whole surface. In the female the fourth segment is yellow both above and below. The head and antennæ are black, the femora blue-black, and the tibiæ yellow. The fore wings are transparent, except the borders and the discal mark, which are blue-black. The outer margin is marked with yellow rays. The hind wings are transparent, with very narrow blue-black margins. The spread of the wings is from 18–22 mm.

This insect can evidently best be destroyed by cutting out and burning infested branches in winter or early spring.

THE BAG-WORM.

(*Thyridopteryx ephemeraeformis* Harris.)

One sometimes sees hanging from the branches of trees, in late summer or in fall or winter, especially in the southern part of the State, rough

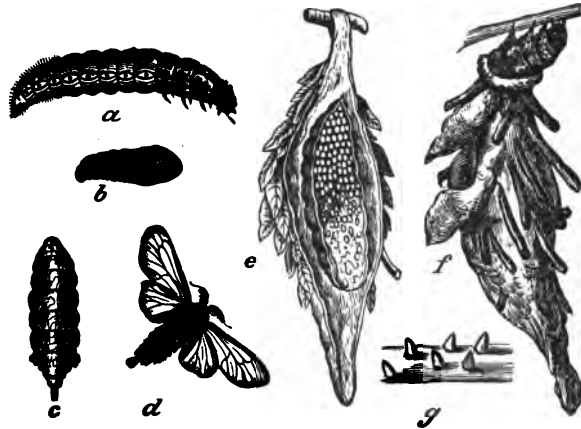


Fig. 41. Bagworm, *Thyridopteryx ephemeraeformis*: a, larva; b and c, pupa, side and back views; d, adult; e, case containing the eggs; f, larva in case; g, eggs. Natural size.

excrescences, about two inches long, shaped somewhat like a spindle full of yarn, soft to the touch, and more or less covered with pieces of dead leaves which seem to be woven into their weblike substance (Fig. 41, f). In summer it may be further noticed that these spindle-shaped sacks can creep along the twig, and that there projects from the end nearest the twig the head and front part of a caterpillar, the remainder of which is enclosed in the protecting bag. In winter this is hung to the tree by a rather tough ligament composed of material like spider-wab. An examination of these peculiar bodies at that season will show either that they are virtually empty, or that they contain a mass of soft yellow eggs. (Fig. 41, e.)

The insect known as the bag-worm, to which these constructions are due, is in several respects one of the most curious in Illinois. Altho the parent form is a moth, the female is wingless and naked (Fig. 41, c), looking more like a grub than a moth, and the wings of the male, instead of being covered with scales, are smooth and transparent, somewhat like those of a wasp. (Fig. 41, d.) The caterpillar infests a considerable variety of both fruit and shade trees, including among the latter evergreens (especially

red cedar and arbor-vitæ, Fig. 42) and several kinds of deciduous trees. It does its injury by eating the leaves of trees, and its numbers are often such that they may take virtually every leaf off a tree of considerable size.

The eggs, contained during the winter in the bag-like cases on the trees, hatch the following May or June, and the young caterpillars begin at once to spin for themselves small conical cases (Fig. 41, *g*) to which they fasten pieces of leaves from the tree upon which they are feeding. As they grow these cases are enlarged until they take the form and dimensions already described. The caterpillars (Fig. 41, *a*) travel but slowly, and seldom leave the tree upon which they were hatched until they are about full grown, when they are likely to spin down and wander about. They change to the chrysalis (Fig. 41, *b*) within the bags, which they fasten to the twigs of the trees as a preliminary, but the grublike female moth, destitute of wings and with only minute and useless legs, deposits her eggs within her native sack, works her way out of it, drops to the ground exhausted, and dies. The winged males



Fig. 42. Bag-worm, *Tyridopteryx ephemeraeformis*, cases hanging on arbor-vitæ twig. (Ohio Experiment Station.)

(Fig. 41, *d*) appear in September and October, and soon thereafter the eggs are laid.

The bag-worm is a southern insect in its general range, and is rarely seen in northern Illinois. It increases in importance southward, and in southern Illinois is often a troublesome pest. In a general trip to eighteen towns, well distributed thruout the State, Mr. J. J. Davis, in 1910, found the bag-worm in four out of six southern Illinois towns visited, but in no others.

The simplest method of destroying these insects is to collect the bags during the winter and burn them—a thing easily done with the aid of pruning shears if they can not be reached by hand. If this measure is neglected, infested trees may be cleared by spraying them with arsenical poisons soon after the hatching of the eggs—the latter part of June or early July. A pound of arsenate of lead to forty gallons of water is a safe and effective poison.

THE POPLAR AND WILLOW BORER.

(Cryptorhynchus lapathi Linn.)

The weeping willow, the Carolina poplar, the balm of Gilead, and the red birch are ornamental trees of sufficient popularity to make the existence of any insect pest destructive to them a matter of general interest. The Carolina poplar especially has had an enormous distribution of late years in Illinois towns, largely because of the ease and certainty with which it may be raised, and the rapidity with which it grows in our soils.



Fig. 43. Small poplar tree in Chicago showing dying of upper branches resulting from attacks of the Poplar and Willow Borer, *Cryptorhynchus lapathi*.

The advent into this country nearly thirty years ago of a European snout-beetle well known in the Old World as a destroyer of alders, poplars, and willows, and occasionally injurious to birches also, has seriously endangered our American plantations of these trees. Detected first in New York in 1882, and found on Staten Island in 1886, it appeared in considerable numbers near Buffalo by 1896, and the following year was reported as abundant in Boston, Mass., and very destructive there to willows and poplars of all kinds, and to the red birch. By 1901 it had reached northeastern Ohio; in 1903 it was found in two Wisconsin nurseries; and in 1904 it was reported

from North Dakota in poplars lately brought into that state from New York. In Illinois it was first seen by us in 1908 in Carolina poplars at Chicago; but once detected there it was soon found to be generally distributed and very destructive to both poplars and willows in all parts of the city. (Fig. 43.) It has not yet occurred, to our observation, elsewhere in Illinois. Wherever it appears it multiplies locally, but makes a slow spread, a fact apparently due to the sluggishness of the parent beetle, which, although provided with wings, makes extremely little, if any, use of them. In consequence of this fact, an infested grove may be nearly destroyed before another, near at hand, becomes even infested. It extends its range most readily along watercourses by means of the willows and cottonwoods with which our streams are likely to be fringed. Its spread to distant points seem to have been mainly, if not altogether, by way of the nursery trade, especially that in poplars and willows of various kinds. These facts make it particularly important that the signs of its presence should be generally known, in order that it may be promptly recognized and suppressed upon its appearance in any new locality.



Fig. 44. Injury by Poplar and Willow Borer, *Cryptorhynchus lapathi*.

Injury by this borer may be suspected when the general health of a tree is evidently affected, where there are dead patches of the bark, irregularly cracked open (Fig. 44, 45), or where openings in the bark give exit to a soft excrement like moist sawdust mixed with fine splinters. The burrows beneath the bark, made chiefly in the cambium layer, are irregular in direction, sometimes girdling a small tree, and show nothing of the symmetrical pattern made by many borers which undermine the bark. Those of the older larvæ dip into the wood, usually reaching the center of the branch unless this is large. These deeper burrows finally become filled with powdered wood and splinters, except a chamber at the farther end in which the larva pupates. In the active boring stage these insects are soft, yellowish, fleshy, cylindrical, footless grubs (Fig. 46) with a pale-brown head and darker mouth-parts. They are half an inch long when they reach full size, which is about the last of June for those most advanced. At this time, however, young larvæ may be found under the bark down to a fifth of an inch in length.

The adult beetles (Fig. 47) begin to appear in July, and continue abroad at least until October. They are well marked and easily distinguished in-

sects, a little more than a quarter of an inch long, thick-bodied, with a roughened and punctured surface, and a stout curved beak projecting downward from the head. The general color is dark sooty brown, more or less



Fig. 45. Injury by Poplar and Willow Borer. *Cryptorhynchus lapathi*.



Fig. 46. Poplar and Willow Borer, *Cryptorhynchus lapathi*, larva. About 4 times natural size.



Fig. 47. Poplar and Willow Borer, *Cryptorhynchus lapathi*, adult. Length, about one-fourth inch.

speckled and spotted with gray, and there is a very conspicuous large patch of light gray on the hinder end of the wing-covers, contrasting strongly with the adjacent colors. The sides of the prothorax are gray, and there is a pair of rather definite oblique gray marks just behind the front outer angle of each wing-cover. The beetle is slow and lumbering in its movements, and when disturbed drops to the ground like a curculio, without attempting to fly. It feeds upon the cambium layer of the younger branches, which it reaches by puncturing the bark with its snout. It lays its eggs in the older bark, mainly of branches from two to four years old. This the female does by first eating downward into the bark by means of the jaws at the tip of her snout, taking half an hour or more to hollow out a cavity in which the egg is concealed. She then turns end for end, and leaves an egg in the chamber thus made, and presently moves away to repeat the process at another point.

The young hatch mainly in August and September, penetrate at once to the cambium layer, and hibernate there while most of them are still very small. The following spring they continue to work in the cambium until nearly ready for pupation, when they enter older wood.

The dependence of the beetle for food upon the bark of the tree which it infests has suggested the use of poisons for its destruction, and some tests made at the New York Agricultural Experiment Station show that the ordinary arsenical poisons applied as a spray will destroy it. Arsenate of lead is the best of these for the purpose, because of its adhesive quality. Trees to be protected should be thoroly sprayed at intervals of about a fortnight, beginning with the middle of July and continuing thru August. Moderately infested trees may be saved by cutting out the grubs and covering the wound with tar. Badly infested trees should be taken out and burned, either during the winter or before July 1 of the following season. Nursery trees infested by this insect should be unhesitatingly destroyed, since they are far worse than worthless, and are the principal means of conveying the species to places not previously infested by it.

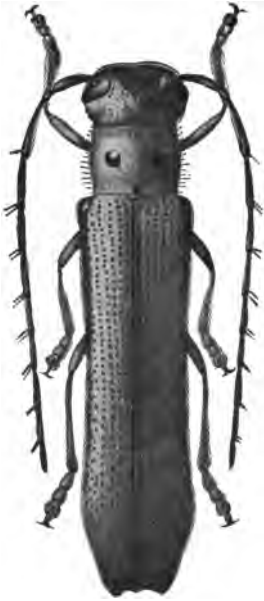


Fig. 48. Dogwood Twig-girdler, *Oberea tripunctata*, adult. About 5 times natural size.

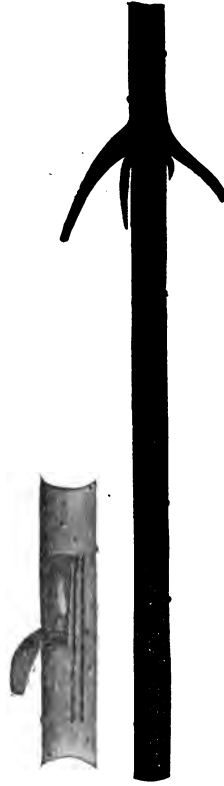


Fig. 49. Cornus twig girdled by Dogwood Twig-girdler, *Oberea tripunctata*, and part enlarged, showing egg in position.

THE DOGWOOD TWIG-GIRDLER.
(*Oberea tripunctata* Swederus.)

Among the insects whose nice and elaborate instincts connected with the placing of their eggs are the wonder of entomologists, we must class the twig-girdlers, for their careful preliminary operations are such as to suggest a knowledge of vegetable physiology and a prevision of the possible difficulties in the way of the development of their young certainly quite beyond the powers of insect intelligence, and an unsolved puzzle if regarded

as a product of natural selection. The twig-girdler of the dogwood is an example.

This is a small, cylindrical beetle (Fig. 48), about half an inch long and less than an eighth of an inch in diameter, which prepares a chosen twig for the reception of the egg by first cutting a groove around it a few inches from its tip in such a way that the twig presently breaks off at this point, and afterwards making a second girdle, not so deep as the first, and from two to four inches farther back. (Fig. 49.) It then makes two parallel cuts,



Fig. 50. Dogwood
Twig girdler, *Oberea*
tripunctata, larva
About 4 times natural
size.

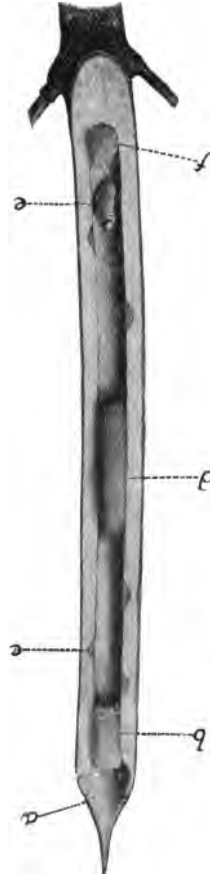


Fig. 51. Cornus twig with
burrow of Dogwood Twig-
girdler, *Oberea tripunctata*; *a*, end
obliquely cut off by larva; *b*,
f, plugs of frass; *c*, openings
made by larva and plugged up
later; *d*, cocoon of Ichneumonid
parasite; *e*, remains of parasit-
ized *Oberea* larva.

about half an inch long, lengthwise thru the bark between the two girdling incisions, and at the proximal end of these makes a short transverse slit in a way to form an angular flap, beneath which it pushes its egg. The effect of all this surgery must be to stop the growth of that part of the branch operated on, and to check the flow of sap to the section in which the egg is laid.

These operations are distributed, in northern Illinois, over the month between the middle of June and the middle of July. The eggs hatch within a week or ten days, and the young larvæ penetrate the twig, burrowing downwards towards its point of attachment, and making holes to the surface at intervals thru which to discharge their excrement. After a time the larva cuts off, from within, the part of the twig thru which it has made its way, and plugs the open end of the burrow with coarse bits of frass. It occasionally repeats this plugging, pursuing its way until winter overtakes it, and pupating within its burrow from the middle to the latter part of the following May, first, however, commonly cutting off the branch obliquely and plugging the cavity a little beyond its pupal cell. (Fig. 50, 51.) The adult emerges during the latter half of June, eats its way thru this terminal twig, and feeds during its short life on the leaves of the infested tree, making oval holes thru the leaves along the course of the veins. (Fig. 53.)



Fig. 52. Dogwood Twig-girdler, *Oberea tripunctata*, pupa. About $2\frac{1}{2}$ times natural size.

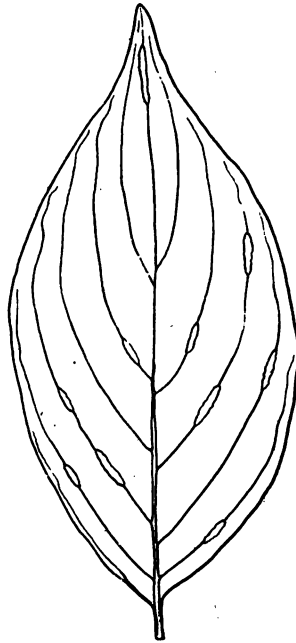


Fig. 53. Cornus leaf injured by feeding of adult Dogwood Twig-girdler, *Oberea tripunctata*.

The presence of this borer is commonly first betrayed by a withering of the leaves at the tip of the girdled shoots. It is a rather common pest in the Chicago parks, where it has often been abundant enough on the red-osier dogwood (*Cornus sanguinea*) to be decidedly injurious. Like the other small twig-girdlers, this species can best be destroyed by cutting off and destroying the affected branches at a time when they are certain to contain the borer; that is to say, in this case, in any month except June and July.

The various species of this genus have been so imperfectly distinguished that a specific description of this will not be attempted here; but the reader is referred to the illustrations for its general characters. Its larva is much subject to destruction by parasites; and a characteristic parasitic species has been repeatedly bred by us from infested twigs.

THE LOCUST BORER.

(Cyllene robiniae Forst.)

A great obstacle to the growth of the common black locust as a timber tree in Illinois has been the work of a borer which infests this tree only, multiplying year after year in a locust grove until it destroys every tree. It was a common practice in the early settlement of the northern part of the State for the farmers to plant a grove of locusts, with a view especially to a supply of fence-posts. These groves were, however, all destroyed by this borer during the middle part of the nineteenth century, and the planting of this tree was universally abandoned at that time. Of course, with the disappearance of the tree the borer likewise disappeared, and the growing of the locust is now again possible if due precautions be taken against its destruction by this insect. Fortunately, the recent work of Dr. A. D. Hopkins, in charge of forest insect investigations for the United States Department of Agriculture, has made it perfectly feasible to grow locusts with little or no loss from this cause, and the following account is mainly taken from his publications on this subject.

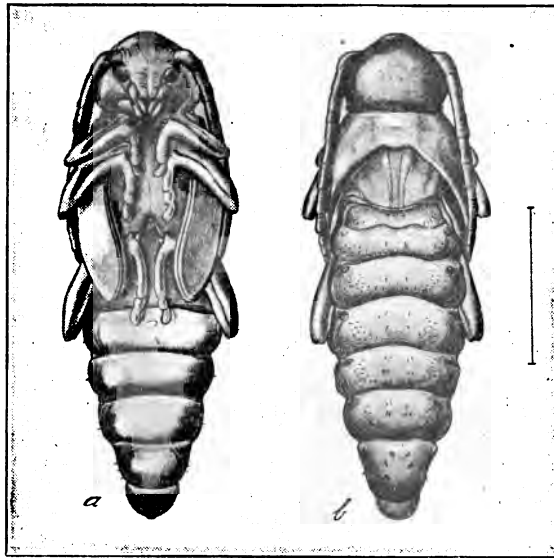


Fig. 54. Locust Borer, *Cyllene robiniae*, pupa: a, front view; b, back view. Enlarged as indicated. (U. S. Dept. of Agriculture.)

The first evidence of attack by this borer in spring is a fine brownish dust and an oozing of sap from the bark. Later, gumlike exudations appear on the injured spots, and quantities of yellowish dust lodge in the forks of the tree or branches, and in the loose bark on the trunk and around its base. Badly infested trees show a dwarfed, faded, or sickly foliage about the middle of May, and many of the leaf buds fail to open. The author of this injury is a whitish, thick-bodied, distinctly segmented, seemingly footless grub, nearly an inch long when full grown, with small head, and only a pair of minute feet on the next segment behind. It hatches from eggs laid in crevices of the bark from August to October. The young borers are still very small when the winter overtakes them, and they hibernate in small cavities made by them in the outer bark of the trunk and branches. They commence operations when the sap of the tree begins to flow the following spring, and presently penetrate the wood, burrowing actively about until

July or August, in central Illinois, when they begin to change to the pupa (Fig. 54), to emerge about a month later in the beetle stage (Fig. 55).

The adult is a very showy, elongate, brown beetle, five-eighths to three-fourths of an inch in length conspicuously marked with three straight bands of bright yellow across the thorax and five broken or irregular bands of the same color across the wing-covers. There is also a bright yellow patch on the upper side of the tip of the abdomen. The beetles are to be found in September, and occasionally in early October, on locust trees, and on various species of goldenrod, upon the flowers of which they feed. Now and then a specimen may survive the winter and be taken abroad in April, or even in May.

From the foregoing statements it is evident that the time of cutting trees, whether to thin the grove or for commercial use, is an important item in the control of this beetle. All such cutting should be done between October 1 and April 1, care being taken that all trees showing the presence

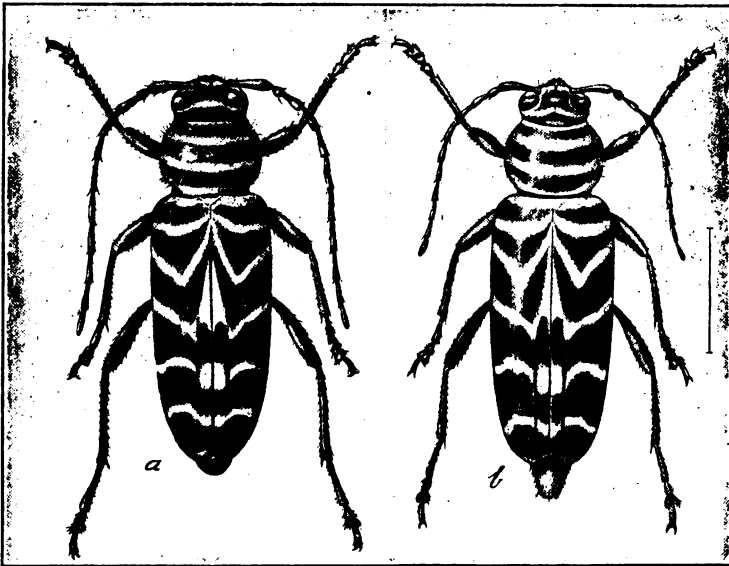


Fig. 55. Locust Borer, *Cyllene robiniae*: a, male; b, female. Enlarged as indicated. (U. S. Dept. of Agriculture.)

of the borer are selected for removal. The bark should then be taken off, and the brush and rubbish should be burned. Simply to kill the larvæ and borers in badly infested and damaged trees, these should be cut and destroyed in May and June, when their condition can be readily detected; but the work should be completed by the time the flowers have all fallen from the trees, as otherwise the borers may mature and escape. Where the beetles are abundant on the goldenrod, they may be attracted and killed, according to Dr. A. D. Hopkins, by smearing molasses poisoned with arsenic upon the trees, due account being taken of the fact that honeybees are liable to destruction by this poison, and that it should not be used where these are kept. Unsuccessful experiments were made by one of my assistants, Mr. W. P. Flint, in 1910, with a mixture of sugar and vinegar, and another of sugar and alcohol. Altho attractive to a variety of other insects, the beetles of the locust-borer paid no attention to them. Tanglefoot, on the other hand, placed on the trees September 16, when the beetles were freely running about mating and laying their eggs, disabled the beetles and put a stop to their operations.

Highly useful directions for the management of locust plantations in a way to prevent injury by borers, are contained in Bulletin 58 of the Bureau of Entomology of the U. S. Department of Agriculture, printed in 1910.

THE OAK TWIG-PRUNER.
(*Elaphidion villosum* Fabr.)

Among the more striking and curious kinds of insect injury to trees are those which take the form of amputation of twigs and small branches during the growing season—an injury which seems purposeless and excessive until one sees just how it benefits the author of it.

The oak twig-pruner (Fig. 56) is one of the best known American insects with this habit of injury, affecting, as it does, a large variety of trees and



Fig. 56. Oak Twig-pruner, *Elaphidion villosum*, larva. About 5 times natural size.

shrubs, and injuring most frequently some of the commonest and most useful species. It is best known, perhaps, for its work on oaks, hickories, and maples, altho it has been reported to attack also apple, peach, pear, plum, quince, locust, red-bud, sumach, Osage orange, fir, grape, and climbing

bittersweet. In Illinois we have bred it from oaks, hickories, persimmon, and peach, and have found it thruout the State. In parts of Michigan, peach trees have sometimes been nearly destroyed by it, and an equally serious injury has been done by it in New York to pears. In Illinois we once found it at Effingham cutting off young apple trees from one to two feet above the ground; and Dr. F. W. Goding reported it, in 1884, as doing great damage to hickory and elm at Ancona, in Livingston County. In Pennsylvania, oak forests have been so infested by it that carloads of the twigs might have been collected from under the trees; and in Connecticut, hickories have been so thoroly pruned that a barrel of twigs and branches have fallen from a single tree.

The injury done by this insect is not, however, so severe as it looks. It may affect considerably the appearance of young trees, by deforming their top; but large trees are generally little harmed by the pruning they receive, and the littering of lawns with amputated twigs is at most an annoyance merely. The girdled twigs and branches may vary in length from a few inches to several feet, but Dr. Fitch mentions one that was ten feet long and over an inch thick. Commonly, however, they are a quarter of an inch or less in diameter, and vary from two to six inches in length. Occasionally a single one will contain two larvæ, the burrows then running down each side of the twig. Fallen limbs, if not disposed of, may serve, as Chittenden has said, as breeding places for various kinds of injurious borers, which may come out from them to attack and injure living trees.

The method of the pruner's work is such that a fallen twig is seen to have been hollowed out centrally—a large part of its interior often being eaten away—and plugged with sawdust, and its larger end has been gnawed off from within, having a cut surface as smooth as if made by a chisel.

The adult twig-pruner is a rather slender, dark brown beetle (Fig. 57) from a half to three-quarters of an inch in length, sparsely covered with coarse white or yellowish hairs which show a tendency to collect in irregular clumps or spots. The edge of the tip of each wing-cover is concave between two stout sharp spines or teeth, of which the outer is usually the larger. The female lays her eggs in the smaller twigs of living trees, most commonly in July. The young larva first eats out the wood under the bark in the direction of the grain, packing its burrow behind it with its castings, and working towards the base of the twig. Later it cuts holes in the bark thru which these castings are rejected, and then follows the center of the

twig, making a channel more or less oval in cross-section, corresponding to its own shape. When it has reached its growth it begins to gnaw, from within, a circular groove, deepening this until the twig or branch is so weakened at this point that the wind readily breaks it off, usually carrying the insect with it. Occasionally, however, the larva is left in its burrow on the tree and finishes its transformations there. The value of this operation to the pruner would seem to be a preparation for the exit of the beetle, which originates within the burrow, but which has not jaws of a sufficient strength to enable it to gnaw its way out thru the wood inclosing it. This explanation, given by Chittenden, seems at least to be the most reasonable among several that have been proposed to account for this curious habit. After the twig has been cut off the larva within it plugs up the severed end, changes to the pupa, and later to the beetle, coming out as an adult the following summer.

Published accounts disagree as to the length of the life cycle of this species. It seems to be a single year under the most favorable conditions, but capable of being lengthened to two or even three years, particularly if the branch dies before the larva is full grown.

As nearly all the borers pass the winter in the fallen twigs, it easily follows that their injuries may be readily arrested by gathering these up and burning them in winter or in spring. This effective measure is so simple and so easily applied that no other seems necessary.

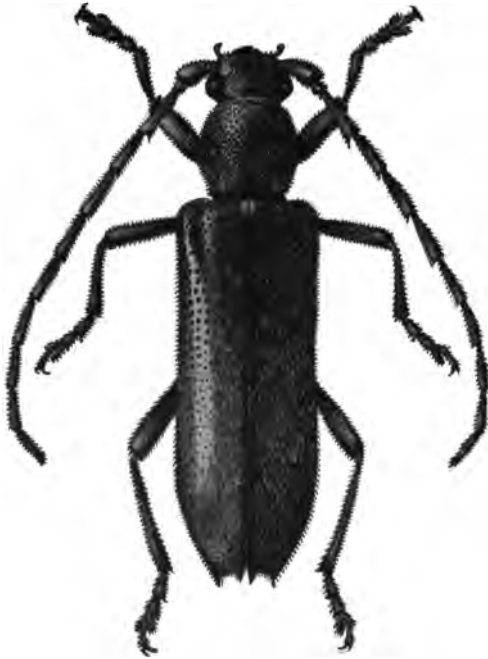


Fig. 57. Oak Twig-pruner, *Elaphidion villosum*, adult. About 5 times natural size.

THE BRONZE BIRCH-BORER.

(*Agrilus anxius* Gory.)

This insect is a deadly pest of the birches, especially of the beautiful and popular white birch, which it is quite capable of exterminating locally if its presence is not early detected and if prompt measures are not then taken for its destruction. As an infested tree is not likely to last more than two or three years, the necessity of energetic measures is obvious. Unfortunately, this insect does not usually make conspicuous local marks of the injury it is doing, and the earliest sign of its presence is often the death of one or more branches in the top of the tree. If a birch is seen to be dying at the top it should at once be examined for evidences of the presence of this borer, since in some cases this condition may be due to drought or other general causes. If the bronze borer be the cause, the fact may be ascertained by lifting the bark from dead branches which are not yet dry, or from the more unhealthy looking spots on the living parts of the tree. If the insect be present, its tortuous or zigzag burrows will be noticed, and further search will disclose the borer itself in one or more of its stages of larva, pupa, or adult. Sometimes, indeed, its presence is shown by a ridged appearance of

the bark, the ridges running crosswise of the branches or in a more or less spiral direction. Peculiar rusty or reddish spots may also be seen on the larger branches or on the trunk where the bark has been undermined by the interlacing burrows of the borer. Often branches weakened by the borers and by consequent decay of the wood, break at the point of injury, either hanging down or falling from the tree. This appearance is rather characteristic of the work of the borers, and may serve to distinguish an infested tree from a "stag head," due to drouth.

In its destructive stage this insect is a small, flattened, footless, creamy white grub about three-fourths of an inch long when full grown, with dark mouth-parts and a small head which is partly drawn back into the broad, flat, pale brownish, first segment of the body. At the opposite end is a pair of minute forceps-like spines, brown and hornlike, with two teeth on the inner edge of each. In this larval condition the borer may be found in its burrows beneath the bark at any time during fall, winter, and early spring. If the tree has been long infested, the bark is usually perforated by small roughly semicircular holes about twice the diameter of the head of an ordinary pin. (Fig. 58.) These holes are made by the beetles when they come out in May and June for their brief life in the open air.



Fig. 58. Exit holes of the Bronze Birch-borer, *Agrilus anxius*, in the bark. Natural size. (Cornell Experiment Station.)

The beetle (Fig. 59) is a hard, small, bronze-green or violet insect, varying somewhat in size, but approximately half an inch long or a little less. It is shining but minutely punctured under glass, with the sides nearly parallel, tapering conspicuously behind to a blunt tip, notched where the rounded ends of the wing-covers come together.

Altho most notorious for its injury to the white birch, especially the cut-leaved variety, it infests all the birches. It is the most destructive enemy of these trees in the Chicago parks, thru which it is generally distributed. It is especially dangerous because there is no means of destroying it which does not involve also the destruction of the infested tree. It is a saddening conclusion which is forced upon the owner of a beautiful birch infested by this borer, that the tree is doomed, and that the only means of saving other trees in its neighborhood is to cut it down to the ground in winter or spring, as early as the first of May, and to burn it, trunk and branches, before the beetles can emerge to lay their eggs elsewhere.

The larvæ hatch in June, and possibly also in July, from eggs laid in crevices in the rougher places of the bark. They bore thru the bark at once and begin to mine in the sapwood, sometimes dipping inward to the older

wood or even penetrating to the center of a small branch. The irregular mine is always packed with the castings of the grub, and increases in diameter, of course, as the latter grows, measuring at the largest about an eighth of an inch across. Here the borer lives in the larval state until the latter part of the following April or early May, when it begins to transform within its burrow to the pupa stage, and within another month to the beetle. This escapes from the tree from the middle to the last of June in northern Illinois, by gnawing through the bark, flies abroad to feed on the leaves of trees, and soon pairs and lays its eggs. Curiously, it seems to feed but little on the birch, preferring the leaves of poplar, willow, and elm to those of its native tree. There is, indeed, some evidence that it infests the willow, producing gall-like swellings on the twigs, but the identity of the species to which this injury is referred is not positively settled.

Trees of large size are often killed by this borer within three or four years after they first become infested, and few live more than two or three years after the top branches begin to die. The necessity of prompt action is thus manifest, and as the time of the escape of the beetles varies with latitude and the weather of the year, it is best to take time by the forelock and to destroy the infested tree as early at least as April 1. Then one may be sure that nothing can have escaped from it to extend the injury.

This insect is not now known to range beyond Virginia to the south or Illinois to the west, but it very likely occurs wherever birches are grown. We have lately found it (1910) outside Chicago, in Elgin, Rock Island, Moline, and Bloomington, abundant enough in all these places to be decidedly injurious to the birches. It has been quite fully discussed by Professor M. V. Slingerland in Bulletin 234 of the Cornell University Agricultural Experiment Station, published in January, 1906, and briefer accounts may be found in the report of Dr. E. P. Felt, State Entomologist of New York, in "Insects Affecting Park and Woodland Trees" (page 284), published in 1905; in an article by F. H. Chittenden published in 1898 in Bulletin 18, new series, of the Division of Entomology, U. S. Department of Agriculture; and in a paper on "A Disease of the White Birch," by John Larsen, printed by the Michigan Academy of Science in its third report (1902).



Fig. 59. Bronze Birch-borer, *Agrilus anxatus*, adult. About 5 times natural size.

THE SCURFY SCALE.

(*Chionaspis furfura* Fitch.)

The so-called scurfy scale is the commonest of all scale insects thruout the State on shade and orchard trees. The female scale (Fig. 60, a, c) is about a tenth of an inch in length, irregularly oval, with a yellowish point at one end, and but very slightly convex. It is nearly white when fresh, but becomes gray or sooty with exposure. The scale of the male insect (Fig. 60, b, d) is narrow, with sub-parallel sides, and is marked by three longitudinal ridges. The species may be readily recognized in winter by the fact that under each female scale will be found a small mass of minute, purplish eggs. The young appear to the naked eye as active, snowy whitish or reddish specks. These insects are often so abundant on an infested tree as to give a scurfy appearance to the trunk and limbs.

This scale insect is a general feeder, but is especially common on roseaceous plants. It also heavily invests the elm, which seems the most susceptible to its injuries of any of our ordinary shade trees. The red-twigged dogwood is often incrustated by it, and the mountain ash, hawthorn, pear, and currant are sometimes attacked. The scurfy scale winters in the egg, and hatches, with us, during the latter half of May—earlier or later according to the season and the part of the State. In central and southern Illinois eggs are laid for a second generation, the date of which, however, has not been accurately determined. Altho' this can not be classed among the more destructive scale insects, it is nevertheless injurious where especially abundant, checking the growth and diminishing the vitality of the infested tree or shrub in a way to make it less presentable and more susceptible to the attacks of other insects and of disease.

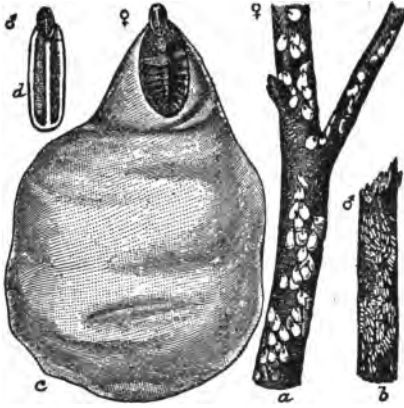


Fig. 60. Scurfy Scale, *Chionaspis furfura*; a, b, female and male scales, natural size; c, d, same, enlarged.

Two insecticide sprays are fairly effective against this insect; one a winter spray of lime and sulphur, prepared and administered as described in detail under the article concerning the San Jose scale, and the other a summer spray of kerosene emulsion, a formula for the preparation of which is given under the cottony maple scale. The lime-sulphur mixture should be applied as late in the winter as practicable, best just before the opening of the leaves in spring. The kerosene emulsion must be applied immediately after the hatching process is virtually complete, a point which can only be determined accurately by careful observation. If the young are allowed to live too long they become covered and protected, after fixing themselves, by a waxy scale which the emulsion will not penetrate. It should be applied in a strength to contain ten per cent of kerosene. Dr. James Fletcher, Dominion Entomologist, Canada, recommended spraying infested trees with a whitewash made by slaking a pound of lime to the gallon of water, one such application to be made in fall as soon as the leaves have fallen, and a second immediately after the first has dried. This is said to loosen the hibernating scales, which subsequently fall from the tree with the dried whitewash.

THE OYSTER-SHELL SCALE.

(*Lepidosaphes ulmi* Linn.)

The oyster-shell scale is among the more conspicuous and easily recognized of the smaller scale insects of our trees and shrubs, the common name suggesting its most conspicuous character. It has, indeed, the convex, elongate, and more or less bent and irregular form of an oyster shell. The female scales (Fig. 61, a, b, c) are about an eighth of an inch long, the male scales (Fig. 61, d, e) smaller, with a little hinge or flap behind, thru which the winged males escape when mature. The scale is usually brown to dark brown in color, tho occasionally bleached to gray by exposure to the winter weather. The eggs of the species hatch in Illinois shortly after the time the apple blossoms fall. Each female scale has during the winter from fifty to a hundred and twenty-five pale yellowish eggs beneath it, from which the young emerge during the latter part of May or the first of June. A second generation occurs in central and southern Illinois early in July. The young are able, at first, to crawl about somewhat actively, and it is principally by this means that the species is distributed, altho it may be conveyed to distant points upon infested nursery stock. The scale insect is both larger and

more injurious than the scurfy scale, and infests also a larger variety of trees and shrubs. Elm, poplar, willow, horse-chestnut, lilac, red-twiggèd dogwood, and currant are among those most frequently and seriously injured.

The treatment for this scale is identical with that described in the article for the scurfy scale, just preceding.

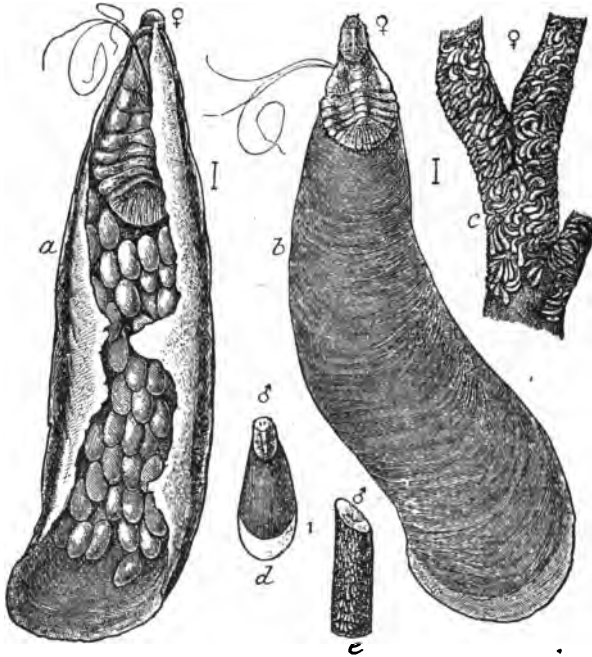


Fig. 61. Oyster-shell Scale, *Lepidosaphes ulmi*: a, female scale, under side, showing insect and its eggs within; b, same, from above; c, same, natural size; d, e, male scale, enlarged and natural size.

THE SAN JOSE SCALE.

(*Aspidictus perniciosus* Comst.)

This notorious and destructive pest is much less injurious to ornamental vegetation than to fruit trees and shrubs, but is nevertheless decidedly harmful to several of the former, particularly to those belonging to the family of roses. It is also very injurious to the mountain ash, but the Japanese quince (*Pyrus japonica*) is the common shrub most likely to betray its presence.

It is a circular, grayish or yellowish, scale insect about one-sixteenth of an inch in diameter, but slightly convex, and marked by a central nipple and one or two surrounding circular ridges. It is an inconspicuous object, but is recognizable by the appearance which it gives to a badly infested bark (Fig. 62), which it covers with dark gray patches of a continuous grayish crust, which exudes, when crushed with the finger-nail, an oily, yellowish substance due to the pressure on the living insects under the scales. The bark of a tree but sparsely infested may be seen, on close examination, to be irregularly speckled with small circular granules which give it an unhealthy look. The surface immediately beneath the living scales often shows a reddish discoloration; and on the leaves and green twigs are more conspicuous red blotches which surround the scales. The largest scales are

about the size of the head of an ordinary pin, and the smallest ones are mere specks on the twig.

This insect passes the winter partly grown, reaches its full size in spring, and begins to bring forth its living young about the first of June, in average years, in the central part of Illinois. These may be seen as minute yellow specks wandering over the surface in search of a suitable place to establish themselves. This period of active life is often limited to a few hours, and at most to one or two days. Three or four generations are bred in a single season.



Fig. 62. San Jose Scale, *Aspidiotus perniciosus*. Natural size. (Connecticut Experiment Station.)

It has been found commonly infesting and often injuring more than seventy trees and shrubs, and occasionally nearly as many more. The commoner kinds coming under the former list are some of the dogwoods, the hawthorns (*Crataegus*), the quinces, the poplars, the cherries and pears, currants and gooseberries, roses, willows, mountain ash, snowberry, lilac, basswood, Osage orange, and the elms. Those less seriously infested are the maples, horse-chestnut, Virginia creeper, the birches, chestnut, catalpa, hackberry, the flowering and other dogwoods, the persimmon, *Forsythia*, white ash, honey-locust, *Ailsea*, pecan, black walnut, mountain laurel, honey-

suckle, mulberry, white spruce, sour cherry, sumach, smoke-bush, locust, raspberry and the blackberry, elder, sassafras, various species of *Spiraea*, arbor-vitae, *Viburnum*, and grape. Popular species not infested by it are *Ailanthus* or tree of heaven, papaw, spice-bush, barberry, trumpet-vine, the hornbeams, cedar, bittersweet, buttonbush, Judas-tree, fringe-tree, pepper-bush, leatherwood, ginkgo, Kentucky coffee-tree, witch-hazel, English ivy, hickories except the pecan, hydrangeas, yellow jasmine, butternut, juniper, larches, sweet gum, tulip-tree, matrimony-vine, wax myrtle, black gum, syringa, pine, sycamore, the oaks, the rhododendrons, bald cypress, trumpet-creeper, blueberry, hemlock, *Wistaria*, and prickly ash. The last list is especially important in Illinois, thruout which the San Jose scale is certain ultimately to become generally distributed, because it includes a large and varied list of ornamentals from which selections may be made without the risk of loss or injury by this most destructive pest.

The San Jose scale is conveyed to distant points mainly by the trade in nursery stock, and otherwise it spreads only by means of the minute crawling young. Its means of dispersal are so slight that it tends to concentrate upon any tree infested until the latter becomes completely covered by it, a fact which, taken together with its numerous generations, its rapid rate of multiplication, and its freedom from parasites capable of overcoming it, make it the dangerous enemy which it has become.

The San Jose scale can be destroyed by the winter use of one of the lime and sulphur mixtures, which may either be purchased ready-made in condition for use by dilution only, or may be brought into solution by boiling the raw materials together according to the following directions.

Materials: 15 pounds of lime, 15 pounds of sulphur, and 50 gallons of fairly soft water. For 50 gallons of the spray, heat 12 gallons of water in a 40-gallon iron kettle, mixing, in the meantime, in a separate vessel, 15 pounds of sulphur with enough water to form a thin paste. Add this sulphur to the water in the kettle and bring the mixture to a temperature just below boiling. Then add 15 pounds of best lump lime, keeping cold water at hand to use as the mixture threatens to boil over. After the lime is fully slaked, boil for 40 minutes, with almost constant stirring. Then strain into a 50-gallon spray-tank and fill with water, which had better be warm, although cold water will do. To prepare 100 gallons of the spray at a time, heat 20 gallons of water in the 40-gallon kettle, add 30 pounds of sulphur—previously reduced to a thin paste with water—and to this put 30 pounds of lime. Boil as before, and dilute to 100 gallons.

If a supply of steam is available for cooking the mixture, this will be found a much more convenient source of heat. The cooking is then done in barrels or other vessels, from which the fluid is strained into the spray-tank. The disturbance caused by the introduction of steam makes stirring unnecessary. When cooked with steam the mixture does not ordinarily become so dark as when boiled over a fire, but the insecticide effect is nevertheless the same.

PUTNAM'S SCALE.

(*Aspidiotus ancylus* Putnam.)

This is a circular or oval, dark gray or black, scale insect, about one-twelfth of an inch in diameter, with a brick-red point at one side of the center. It closely resembles the San Jose scale in general appearance, but does not present the conspicuous ring and nipple structure of the latter, altho the young have usually a nipple and a rather indefinite ring.

It passes the winter but partly grown, but differs from the San Jose scale in the fact that it reproduces by means of eggs laid in late spring or early summer. There is but one generation in a season.

It has been found on elm, willow, oak, hemlock, mountain ash, *Ilex*, white birch, *Prunus*, ash, beech, hackberry, linden, maple, Osage orange, and water-locust. It is rarely injurious enough to require special attention.

THE WALNUT OR WILLOW SCALE.
(*Aspidiotus juglans-regiae* Comst.)

This species, altho common on a number of shrubs and shade trees, is of little importance except on the willow, to which it is a veritable pest. It is easily distinguished from other scales of the San Jose relationship by its relatively large size, its diameter being 3 mm., or an eighth of an inch. The female scale (Fig. 63, *a*, *e*) is circular, flat, with a prominent pink or reddish point at one side of the center. The male scale (Fig. 63, *b*, *d*) is elongated, with a corresponding point near one end. The female passes the winter as an adult, and lays her eggs in early spring.

Treatment the same as that for the scurfy scale.

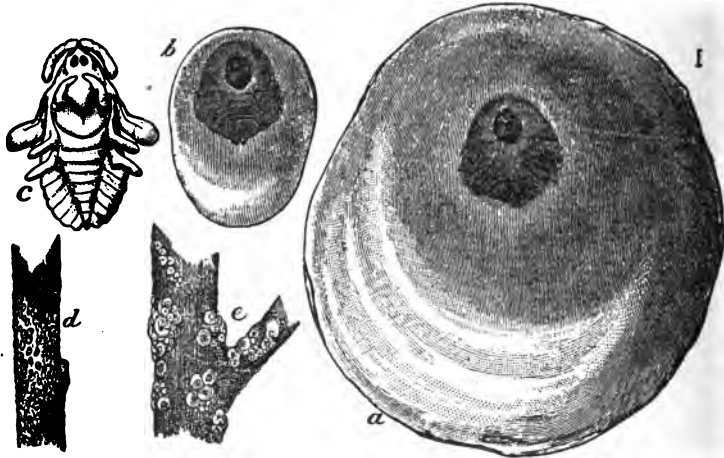


Fig. 63. Walnut Scale, *Aspidiotus juglans-regiae*: *a*, *b*, female and male scales, enlarged; *c*, male pupa; *d*, *e*, male and female scales, natural size.

THE COTTONY MAPLE SCALE.
(*Pulvinaria vitis* Linn.)

The cottony maple scale (Fig. 64) is one of the best known scale insects because it heavily infests several very common shade trees, and because the cottony masses beneath the body of the adult female in early summer make it a very conspicuous object. These large white masses are a deposit of waxy threads within which are the minute, oval, pale yellowish eggs.

The history of this insect in Illinois since 1867 exhibits successive periods of abundance and of scarcity, each averaging about four or five years for the State as a whole. That is, thruout some considerable part of the State, and often over most of it, the maple scale has been injuriously abundant once in eight or ten years, and its period of abundance has lasted, as a rule, about half this time. In any given locality, however, it has usually been injurious for a much shorter time, often for not more than one or two years. The cessation of its injuries and its virtual disappearance from the trees infested by it have seemingly been due almost wholly to the agency of its insect enemies.

The soft maple (*Acer saccharinum*) is the tree most generally and heavily infested by this insect. The hard maples, on the other hand, are infested but slightly if at all. The box-elder is also greatly subject to injury, and next to this, perhaps, the linden or basswood. Among the other trees and woody plants often more or less injured, are the elm, honey-locust, black locust, black walnut, sumac, willow, poplar, beech, hawthorn, bittersweet, grape-vine, and Virginia creeper. We have found



Fig. 64. A Soft maple twig badly infested with adults of the Cottony Maple Scale, *Pulvinaria vitis*. About natural size.

mature egg-laying females on the horse-chestnut, honeysuckle, dogwood, trumpet-creeper, mulberry, snowberry, smoke-tree, *Spiraea*, false syringa (*Philadelphus*), and *Wistaria*. Oak, ash, and catalpa are not infested in northern Illinois, but injury to oaks is reported from Georgia. The pear is said to be most liable to injury among the fruit trees, and apple, plum, and peach are sometimes infested. Serious damage to fruit trees is, however, very unlikely. The migrating young, which are often washed from trees by rain, or blown off in considerable numbers, may maintain themselves for a time on a great variety of woody and herbaceous plants, those on the latter, of course, perishing with the advent of frosts.

In early summer this scale, when very abundant, coats the under side of heavily infested limbs with a thick layer of cotton-like waxy masses, each projecting from beneath a brown cap or scale—the flat body of the mature female. This “cotton” is secreted and the eggs are deposited within it in late May or early June in the latitude of central Illinois, but usually one or two weeks later in the Chicago district.

Something over 3,000 eggs are usually laid by each female, the number ranging, in our counts, from 2,856 to 3,863, with an average of 3,410. In

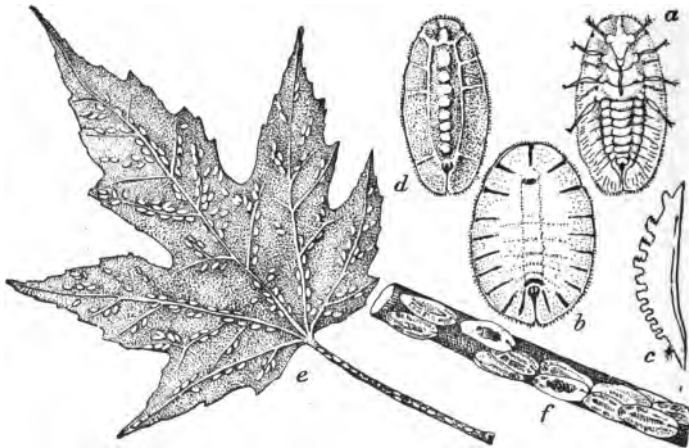


Fig. 65. Cottony Maple Scale, *Pulvinaria vitis*, immature stages: a, newly hatched young, under side; b, c, young female, top and side views; d, young male; e, f, young on leaf and leaf stem. Natural size shown in a.

central Illinois the eggs ordinarily hatch in June, and in the northeastern part of the State in early July, or later if the weather of the time is unfavorable. Virtually all are hatched, as a rule, by the end of July.

When first hatched the six-legged young (Fig. 65, a, e, f) move slowly about as creeping yellowish specks about twice as long as wide. They soon settle upon the leaves, mostly upon the under side along the veins, but a considerable percentage also on the upper surface. Soon after settling down, a thin waxy layer forms on the back, and in about three weeks the insect has virtually doubled in size. As they increase in size the male and female scales become distinguishable (Fig. 65, b, c, d) by the fact that the former are comparatively narrow and more convex. From these the winged males (Fig. 66, a, b, c) emerge to fertilize the stationary females in August and September, perishing soon thereafter. In autumn the young females migrate from the leaves, which are about to fall, to the twigs, upon which they pass the winter and, indeed, the remainder of their lives. In spring the female scale (Fig. 67) is elliptical, convex on the back, with a low, rounded, median ridge. It is pale greenish or whitish yellow, marked with black or dark brown. When full grown, about the middle of May, it is 4

to 6 mm. long and 3 to 4.5 mm. wide. Its body is at first closely applied to the surface of the twig, but with the development of the eggs beneath it the abdomen is gradually raised from the bark to an angle of forty-five degrees or more.

It is usually difficult to say whether trees infested by this insect should receive special treatment, or whether they may be safely left to the natural

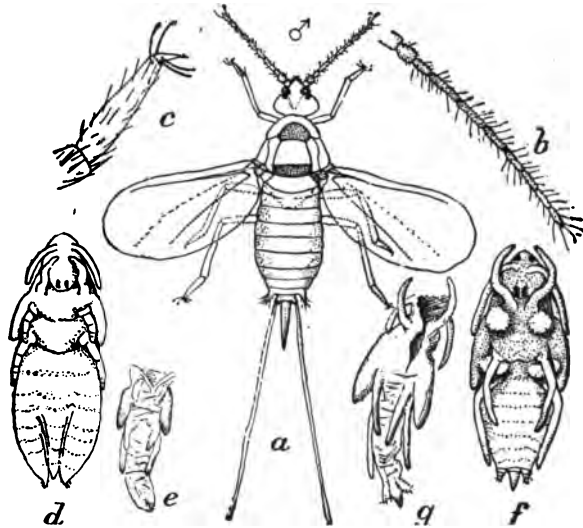


Fig. 66. Male of Cottony Maple Scale, *Pulvinaria vitis*: a, adult; b, c, antenna and leg enlarged; d, e, second stage of pupa and its cast skin; f, g, true pupa and its cast skin. All greatly enlarged.

course of events. The cottony maple scale is extremely subject to parasites and attacks of other insect enemies, particularly to the black hemispherical ladybugs and their larvae, the latter of which feed upon the egg masses in spring and summer. With an extraordinary abundance of the scale insects themselves these insect enemies improve the opportunity for unusual multiplication in a way to produce a greater number than can possibly be maintained permanently by the scale insects. A check is thus put upon the increase of the latter which, within a few months, may reduce them to insignificance. The consequence is an irregular periodicity in the numbers of the cottony maple scale such that two years of injurious abundance rarely succeed each other in the same place. Nevertheless, where trees are evidently suffering from the scale attack it is always prudent, and often necessary, to take artificial measures of protection.

As the newly hatched young are especially susceptible to the petroleum insecticides, which act by contact, a definite knowledge of the hatching period has an important practical value. In central Illinois this period extends approximately from June 15 to July 20. In and about Chicago it commonly begins about two weeks later, and continues for a period of three weeks, this retardation being apparently due to the higher latitude and to

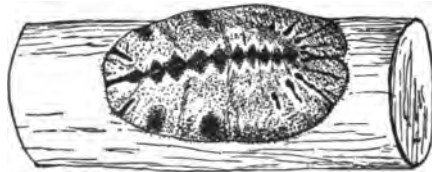


Fig. 67. Cottony Maple Scale, *Pulvinaria vitis*. Adult female in spring, just before the formation of the cottony egg sac. Enlarged.

the neighborhood of Lake Michigan. The period varies, in short, as to its beginning time, with the advancement of the season, and once begun, the rapidity of the hatching will depend, other things being equal, on the warmth of the weather. It is also influenced locally by the amount of foliage on the trees, the eggs hatching later and more slowly in a dense tree-top than in one more open to the sun.

The only insecticides available against these insects are those which kill by contact, and of these the kerosene mixtures have thus far been found the most useful. Even these can be applied only to the young scales shortly after they hatch from the egg, no insecticide treatment being available for the destruction of the large and conspicuous females upon the twigs in May and June. The common kerosene emulsion, made by thoroughly and intimately mixing kerosene with one-third of its volume of a strong soapsuds, is a satisfactory spray when diluted to contain ten per cent of kerosene for summer use, and sixteen to eighteen per cent is used in winter. As a summer spray this emulsion must be used twice in succession, once when about half the eggs are hatched and again about ten days thereafter. A single treatment in winter is about the equivalent in practical effect of two such summer sprays. Large trees in a sandy soil, and especially those in more or less unthrifty condition, should be guarded against possible injury to the roots from the dripping of the kerosene spray, or from that part of it which may run down the trunk and so reach the earth. For this purpose it would be well to cover the ground before spraying with a thin layer of straw, packed closely around the base of the trunk, and later to gather this up and carry it away.

The cost of materials for large trees will average approximately fifteen cents a gallon for the summer spray, and about twice as much for the winter strength.

Kerosene emulsion is made as follows: Dissolve one pound of common soap, or half a pound of whale-oil soap, in one gallon of water by boiling, remove from the fire, and add two gallons of kerosene. Then with a spray pump force the mixture back into itself for about five minutes, or until it presents the appearance of a thick cream and no longer separates on standing. This is the undiluted emulsion. For a mixture containing ten per cent of kerosene, add seventeen gallons of water to the three gallons thus prepared. For an eighteen-percent kerosene emulsion, add eight gallons of water to the stock emulsion. Soft water is to be preferred.

The following tables will show the effects of kerosene sprays as applied by us in 1905 and 1906.

SUMMER SPRAY.

Treatment.		No. of trees.	Leaves examined.	Scales examined.	Per cent killed by spray.
Insecticide.	Part of hatching period.				
10 per cent kerosene	Beginning	1	75	48,789	33
10 per cent kerosene	Middle	1	50	19,425	64
10 per cent kerosene	End	3	150	231,771	68
10 per cent kerosene	Middle and end	1	100	57,179	82

WINTER SPRAY.

When sprayed.	Per cent of kerosene.	Date of counting.	Scales counted.	Per cent killed.
December 26 to January 5 (once)	19	Feb. 1	12,708	86
January 11 to 13 (once)	20	Feb. 1-2	23,061	91
January 11 to 13 and March 30 (twice)	19-24	June 10	48,395	91

MINUTES OF THE MEETINGS
OF THE
Board of Directors and Various
Committees
OF THE
ILLINOIS FARMERS' INSTITUTE

For the Fiscal Year Ending June 30, 1916

MINUTES OF EXECUTIVE COMMITTEE AND BOARD OF DIRECTORS MEETINGS.

MINUTES OF MEETING OF EXECUTIVE COMMITTEE HELD IN HOTEL SHERMAN, CHICAGO, JULY 14, 1915.

The committee met pursuant to call of the chairman. Those present were: President George F. Tullock; Directors D. M. Marlin, H. E. Young, Frank S. Haynes; and the secretary.

The minutes of the previous meeting were read and approved.

Mr. John M. Byrne, secretary of the Decatur Commercial Association, appeared before the committee and after explaining the cause of the delay in securing the necessary accommodations for holding the Twenty-first Annual Meeting in that city, reported that the places selected by our Executive Committee had been secured, and he presented a written guarantee that they would be in readiness for the meeting in February.

On motion, the report was approved and the committee unanimously decided that the meeting shall be held in Decatur on Tuesday, Wednesday and Thursday, February 22, 23 and 24, 1916.

The secretary was instructed to notify those persons interested in Bloomington and Streator of the action taken.

On motion, the secretary was instructed to employ L. M. James and Clifford Livingstone as stenographers in the central office; Mr. James at \$51 per month and Mr. Livingstone at \$32.33 per month.

On proper motion, the duties of "Field Worker" were added to those of the Department of Household Science Secretary, and the compensation for the performance of the duties of both these positions not to exceed one thousand dollars (\$1,000) per annum.

The secretary reported a number of applications for canning schools in various parts of the State and the committee instructed him to arrange for and supply instructors to as many of these schools as practicable with the funds now available for the purpose.

A list of books needed in the Household Science Library was presented and approved, and on motion, the secretary was instructed to secure the books, revise the library list and publish in pamphlet form a complete list of the books in the library for the use of the clubs throughout the State.

The secretary was authorized to visit such counties as have failed to arrange for institute meetings, secure the cooperation of local persons who are willing to lead the work locally, arrange schedules for meetings and report to the director of the district, suitable and available persons for temporary officers, in cases where no officers are now serving.

The secretary was instructed to procure suitable stationery for the members of the board of directors, the office and officers of the Department of Household Science.

The committee adjourned to meet on call of the chairman.

Approved September 21, 1915.

MINUTES OF MEETING OF THE BOARD OF DIRECTORS HELD IN THE INSTITUTE ROOMS, SPRINGFIELD, SEPTEMBER 21, 1915.

President Tullock called the meeting to order at the appointed time: Those present were: Directors Abbott, Allen, Ashdown, Burroughs, Geweke, Gregory, Hopping, Mann, Marlin, Mason, J. P.; Mason, S. B.; Oldfield, Pickett, Schwinge, Tullock, and Young.

The minutes of the previous meeting and those of the Executive Committee meetings were read and approved.

The secretary gave brief report of progress of the work.

The rule of the State Superintendent of Printing which prevents the submission of proof for final correction, was discussed and on motion, a committee of three members was appointed to confer with the Superintendent of Printing about the matter. On this committee the president appointed Directors Burroughs, Abbott, and Hopping.

The vacancies in the directorship of the even numbered congressional districts were considered and the following named persons were elected to fill the vacancies:

Second District—August Geweke, Desplaines.

Fourth District—Wayne Dinsmore, Union Stock Yards, Chicago.

Sixth District—P. R. Barnes, 517 Oxford Building, 118 South LaSalle Street, Chicago.

Eighth District—James R. Clark, 4845 Milwaukee Avenue, Chicago.

Mr. Robert G. Gould, representing the American Manufacturers Association of Products from Corn, addressed the meeting giving information about the bill in Congress repealing the special tax on corn flour when blended with wheat flour. A resolution recommending the repeal of the law was laid on the table.

Plans for holding a Farmers' Institute meeting in the city of Chicago some time during the coming winter were discussed and the Executive Committee was authorized to investigate and if deemed advisable, arrange to hold a one or two-days meeting in Chicago.

The Executive Committee was authorized to arrange the program for the Twenty-first Annual meeting along lines suggested by the conference held in Decatur last May.

On motion, a special committee was appointed to draft resolutions on the death of Director John M. Clark, and Mr. Gregory, chairman of this committee presented the following resolution and moved its adoption:

WHEREAS, An All-wise Providence has removed from our midst our brother director and friend, John M. Clark, of the Fourth Congressional District; and

WHEREAS, Through his death this board has been deprived of one of its oldest and most valued members; therefore be it

Resolved, That the board of directors of the Illinois Farmers' Institute extends its deepest sympathy to the bereaved family; and be it further

Resolved, That a copy of these resolutions be made a part of the permanent records of the board.

Unanimously adopted.

Directors Marlin, Burroughs, and Tullock were selected as a special committee to call upon the Governor and extend to him an invitation to address the Twenty-first Annual Meeting at Decatur, on the evening of Tuesday, February 22, 1916. The committee reported that the Governor accepted the invitation.

On motion, the officers of the Department of Household Science were authorized to attend a conference of extension workers at the University of Illinois, should such conference be called and to report to the board any recommendations that may be adopted.

On motion, the board adjourned to meet on call of the president.

Approved October 8, 1915.

MINUTES OF EXECUTIVE COMMITTEE MEETING HELD IN HOTEL SHERMAN, CHICAGO, FRIDAY, OCTOBER 8, 1915.

Those present were: President George F. Tullock; Directors D. M. Marlin and H. E. Young.

The meeting was called for the purpose of considering the request of the Superintendent of Printing for a reediting of a portion of the Twentieth Annual Report, and for discussing the various features of the program for

the Twenty-first Annual Meeting to be held in Decatur, February 22, 23 and 24, 1916.

After a thorough consideration of the request of the Superintendent of Printing, and after consulting the laws relative to these matters, the committee drafted the following reply:

October 8, 1915.

Mr. J. Frank Higgins, Superintendent of Printing, Statehouse, Springfield, Ill.

DEAR SIR: We have received from you, under the date of September 30, the following communication:

STATE OF ILLINOIS,
SUPERINTENDENT OF PRINTING,
SPRINGFIELD, September 30, 1915.

Mr. H. A. McKeene, Secretary, Illinois Farmers' Institute, Springfield, Ill.

DEAR SIR: I am returning herewith part of manuscript for the Twentieth Annual Report of the Illinois Farmers' Institute, with request that manuscript be edited and such portions as may be construed as criticisms of the General Assembly or any committees of the General Assembly, or any branch of the State Government be eliminated, on the grounds that this is matter of interest to individuals only and not important information concerning public affairs.

This office has adopted the policy of declining to issue printing orders for any publications which directly or indirectly attempt to criticise the General Assembly or any branch of State Government.

Very respectfully,

[Signed] J. FRANK HIGGINS,
Superintendent of Printing.

We note that the manuscript which you have returned for revision is part of a verbatim report of the proceedings of the Twentieth Annual Meeting, also some of the minutes of the meetings of the board of directors and its committee meetings. To convince you that your action in this matter is not well advised it should only be necessary to call your attention to the fact that in 1895 the people of the State of Illinois, represented in the General Assembly, considered the work of the Illinois Farmers' Institute of such public interest and importance as to create it a "Public Corporation of the State" and to instruct it to hold public meetings

"For the purpose of developing greater interest in the cultivation of crops, in the care and breeding of domestic animals, in dairy husbandry, in horticulture, in farm drainage, in improved highways, and in general farm management through and by means of liberal discussions of these and kindred subjects."

They also made it the duty of the Illinois Farmers' Institute to

"Make annual report to the Governor of its transactions, which report shall include papers pertaining to its work and addresses made at the annual meeting of the organization, and a classified statement of all money received and of all expenditures made, and fifty thousand copies of such report shall be printed and bound in cloth, etc., etc."

Neither this law nor any part of it has ever been repealed and we deny your authority to order any part of the copy eliminated or to refuse to issue a printing order for its publication as required by the act creating the Illinois Farmers' Institute, with amendments thereto, approved and in force July 10, 1909.

The matter you desire eliminated is part of a verbatim report of the Twentieth Annual Meeting of this "Public Corporation of the State," also a portion of the minutes of the meetings of its board of Directors and the minutes of its legally constituted committees, all being matters of public record. The copy has been compiled, edited and submitted in compliance with the law and we have no authority to suppress or change it in order to comply with your request.

You evidently hold that the "Act to revise the law in relation to State contracts," approved June 22, 1915, repeals the "Act creating the Illinois

Farmers' Institute." We respectfully call your attention to the fact that the courts have repeatedly held that "A clause in a general act can not repeal a special act," such as the act creating the Illinois Farmers' Institute.

In conclusion, we are returning herewith the copy and we desire to inform you that we have submitted the copy for the Twentieth Annual Report and have issued proper requisition for its publication. You have acknowledged receipt of same, and if proof is not submitted within a reasonable time, the people who are entitled to the information shall know how and why it is suppressed.

Very truly yours,

ILLINOIS FARMERS' INSTITUTE,
By GEO. F. TULLOCK,
D. M. MARLIN,
H. E. YOUNG,
FRANK S. HAYNES,
A. N. ABBOTT,
Executive Committee.

H. A. McKEENE, *Secretary.*

The secretary was instructed to send the communication to the absent members of the committee for their signatures, then forward it to the Superintendent of Printing, returning therewith, without alteration, the manuscript in question; he was also instructed to transmit a copy of the letter to the Governor, by registered mail.

The program for the Young People's Sessions at the Annual Meeting as submitted by Mrs. J. C. Hessler, was approved, and many suggestions for the other sessions were outlined and the secretary was instructed to communicate with those mentioned and report progress from time to time until the outline is completed.

The committee adjourned to meet on call of the chairman.

Approved November 17, 1915.

MINUTES OF EXECUTIVE COMMITTEE MEETING HELD IN INSTITUTE ROOMS, SPRINGFIELD, ILL., NOVEMBER 17, 1915.

The committee met in response to the call of the chairman and matters pertaining to the arrangement of the program for the State Meeting were discussed after the secretary had reported progress. Additional suggestions were made and the secretary was instructed to confer with the organizations in Decatur and complete tentative arrangements to be submitted to the board of directors at its next meeting.

The following resolution was unanimously adopted:

Be it Resolved by the Executive Committee of the Illinois Farmers' Institute, That we endorse the idea of free and unrestricted discussion of questions that pertain to the welfare of the farming interest. We, therefore, call the attention of our members to and urge that they attend the Third National Conference on Marketing and Farm Credits, to be held in Chicago, November 29-30 and December 1-2, at the Hotel Sherman. Such questions as the better distribution of farm products, landlord and tenant relationship as it affects the problem of marketing and rural credit and the marketing of farm products in standardized grades demand intelligent consideration of the American public.

Be it Further Resolved, That this committee appoint one member from each county in the State of Illinois as a delegate to represent the Illinois Farmers' Institutes at the coming conference.

The following named directors were appointed to serve as a committee to draft resolutions on the death of Hon. A. P. Grout: Messrs. F. I. Mann, Ralph Allen, and H. E. Young.

It was the opinion of the committee that a meeting of the board of directors should be held in Chicago, Tuesday, November 30.

The secretary was authorized and instructed to accept the management of the Scott County Farmers' Institute, pay the expenses, and report to the committee at its next meeting.

The secretary reported that the Superintendent of Printing and the State contractor were not following copy submitted for the Twentieth Annual Report, but were omitting portions of the record of board meetings, committee meetings, officers' reports and some addresses made at the Annual Meeting.

After thorough discussion of the matter, the following resolution was unanimously adopted:

WHEREAS, The Illinois Farmers' Institute in an endeavor to comply with section 4 of the act creating it, approved June 24, 1895, viz:

"The Illinois Farmers' Institute shall make annual report to the Governor of its transactions which report shall include papers pertaining to its work and addresses made at the Annual Meeting of the organization, etc., etc.," has submitted the copy of its Twentieth Annual Report for printing, the same having been carefully edited and approved by the board of directors of the Institute; and

WHEREAS, The Superintendent of Printing, J. Frank Higgins, has without authority of law, marked for omission certain portions of the proceedings of the board of directors, its authorized committees, reports of officers and committees, together with addresses made at the Annual Meeting; and

WHEREAS, The Illinois State Journal Co., which has the contract for printing said report, is following the instructions of the Superintendent of Printing and is omitting the aforesaid portions of submitted copy; therefore, be it

Resolved, That we authorize the secretary, H. A. McKeene, to employ attorneys and instruct them to institute legal proceedings to compel the Superintendent of Printing and the State printing contractors to print the report as per original copy approved and submitted.

D. M. MARLIN,
H. E. YOUNG,
FRANK S. HAYNES,
A. N. ABBOTT,
GEO. F. TULLOCK,
Executive Committee.

Approved November 30, 1915.

MINUTES OF MEETING OF BOARD OF DIRECTORS HELD IN HOTEL SHERMAN, CHICAGO, NOVEMBER 30, 1915.

Those present: President, Geo. F. Tullock; Directors Abbott, Aiken, Allen, Barnes, Burrows, J. B.; Clark, Haynes, Hopping, Mann, Marlin, Mason, S. B.; Oldfield, Pickett, Schwinge, Swift, and Young.

The minutes of the previous meeting were read, corrected and approved.

The minutes of the meetings of the Executive Committee which were held on October 8 and November 17 were read, approved and ordered filed as a part of the permanent record.

The secretary reported that Gillespie & Fitzgerald had been engaged to conduct court proceedings to prevent the Superintendent of Printing and the contractors from omitting some of the addresses made at the Twentieth Annual Meeting as well as important parts of the transactions of the institute, from the annual report; that that attorneys had been engaged only after the following letter had been received from the Attorney General in reply to our request for his opinion as to whether or not the Superintendent of Printing had authority to suppress any part of the report of the Illinois Farmers' Institute:

P. J. LUCEY, *Att. Gen.*

STATE OF ILLINOIS,
OFFICE OF THE ATTORNEY GENERAL.
SPRINGFIELD, November 16, 1915.

State Matters:

State Contracts.

Hon. H. A. McKeene, Secretary. Illinois Farmers' Institute, Springfield, Ill.

DEAR SIR: Your communication of November 16, 1915, has been received. In this you say that a controversy has arisen between you and the Superin-

tendent of Printing, relative to what shall be contained in the publication of the annual report of the Illinois Farmers' Institute to the Governor. In this communication you quote the law relative to the publication of this annual report, and cite the law creating the office of the Superintendent of Printing and prescribing his duties. You request my opinion as to whether or not the Superintendent of Printing is authorized by law to order the State contractor to omit from this report any of the transactions of the board of directors of the Illinois Farmers' Institute, reports of its officers, of its various committees, or any of the addresses or papers given at the annual meeting.

In reply to your communication I will say that by law the duties and powers of the Attorney General are limited to advice given to State officers, State commissions and State's attorneys, and that this power does not extend to advice given to private or public corporations, or to individuals.

The Supreme Court of this State, in the case of the Illinois Farmers' Institute v. Brady, 267 Ill., p. 98 on p. 102 of the opinion, say, with reference to the Illinois Farmers' Institute:

"Neither the corporation, the Illinois Farmers' Institute, nor its members, officers or employees, are officers of the State or any political subdivision and do not perform any functions of government."

By virtue of section 2 of an act to revise the law in relation to State contracts, to be found on page 672 of the Session Laws of 1915, the Superintendent of Printing is created a State officer.

By virtue of the law defining the duties and powers of the Attorney General, it is the duty of the Attorney General to advise the Superintendent of Printing, and in view of the fact that this is a controversy between a State officer and a corporation, which is not a State officer, it would be highly improper for me, as Attorney General, to advise with the Illinois Farmers' Institute relative to its contentions with the Superintendent of Printing. However, I will suggest that section 33 of an act of the Forty-ninth General Assembly, entitled "An act to revise the law in relation to State contracts," to be found in the Session Laws of 1915, on page 682, provides as to the reports of officers as follows:

"Each report, before being submitted to the Superintendent of Printing, for printing shall be carefully edited, and there must be omitted therefrom all journals and minutes of proceedings and all correspondence, petitions, orders and other documents or writings whose substance can be briefly stated. No report shall contain any advertising matter nor any copying of the Session Laws or statutes, except minor extracts explanatory of and incorporated in the text. Statistical tables shall, so far as practicable, be consolidated. All matter which is of interest to individuals chiefly, and not important information concerning public affairs, shall be omitted therefrom. Any printer's copy of a report failing to comply in substance with the provisions of this section, shall be returned to the proper officer for correction, and until the corrections ordered by the Superintendent of Printing are made, such report shall not be printed."

I regret that I am unable to serve you in this instance, but you no doubt appreciate the motive which prompts me to decline so to do.

Very respectfully,

[Signed] P. J. LUCEY, *Attorney General*.

The special committee appointed to draft resolutions on the passing of Hon. A. P. Grout, reported the following and moved its adoption:

Desiring to record an expression of deep sorrow because of the loss of our former associate and friend, Albert P. Grout, and of our great appreciation of his services which for nearly 40 years was so intelligently and unselfishly rendered the cause of scientific agriculture, we, the board of directors of the Illinois Farmers' Institute, recall his untiring efforts in behalf of the Institute, his splendid ability, his faithfulness to every trust, his zeal for the betterment of young people and his ambition for the dissemination of agricultural truths and the development of American manhood and American agriculture.

We recall the fact that his voice and pen have had a large and lasting influence in the development of the agriculture of the State and country, in the education of the farm boy and girl by bringing to them a better conception of advantages of farm life wherever effort is intelligently applied.

We recognize his unceasing efforts in behalf of the University of Illinois, the College of Agriculture and the Agricultural Experiment Station; how he realized that these institutions were the source of the information so necessary for the success of the practicing farmer and stockman; how he secured this information, applied it in his own farm operations and then traveled over the country often at great personal inconvenience and sacrifice, that others might profit by his experience.

We remember his great interest in the farm boys of his home district, how for several years he conducted a "Boys' Farm School Camp" for two weeks during vacation season, providing food, shelter, instruction and recreation that they might realize the possibilities of agriculture when science, as well as art, is used in the business of farming. This movement was the forerunner of our present so-called "Short Courses in Agriculture," which have become so popular and valuable in many localities. He was an early, ardent advocate of silos and alfalfa and his efforts in their behalf are known throughout the nation.

We recall his steadfastness as a friend, also his uncompromising opposition to movements and measures which he considered unwise. He was an educator, lecturer, writer, business man and farmer. He saw, with clear vision, the undeveloped possibilities of agriculture and the opportunities of the citizen farmer, and no man has been more closely identified with agricultural development in Illinois; therefore be it

Resolved, That, though spoken or written words cannot adequately record the unconscious influence of this good man's life, we would thus pay tribute to his nobility of character, to his high ideals, and to his worth to the commonwealth; that to his immediate family the loss is greatest and we most deeply sympathize with them and bespeak for them the consolation that must come from knowing he lived a life which commanded the respect, the admiration and the confidence of his fellow citizens; and, be it further

Resolved, That the Executive Committee be instructed to prepare for our records and for distribution to the friends of Illinois Agriculture, a memorial which shall contain a brief sketch of Mr. Grout's life and work, and of which these resolutions shall be part.

The resolution was adopted by an unanimous rising vote.

F. I. MANN.
RALPH ALLEN.
H. E. YOUNG.

The secretary reported having accepted the responsibility of arranging for and holding the Scott County Farmers' Institute meeting; that a successful meeting was held at Bluffs, Ill., November 19 and 20 and that a permanent organization has been formed at that place.

The Executive Committee was instructed to take up with the Manufacturers' Association, the consideration of interests affecting agriculture with a view to cooperative action for improvement of conditions.

Mr. P. R. Barnes, secretary of the committee appointed to promote and direct Farmers' Institute work in Cook County, reported progress and predicted interesting meetings unless something unforeseen happens to prevent.

The tentative outline for the program for the Twenty-first Annual Meeting was discussed and additional suggestions given.

On motion the board adjourned to meet on call of the president.

Approved March 7, 1916.

MINUTES OF MEETING OF BOARD OF DIRECTORS HELD IN INSTITUTE ROOMS, SPRINGFIELD, MARCH 7, 1916.

Those present were: President Tullock; Directors Abbott, Allen, Ashdown, Barnes, Blair, Burrows, Burroughs, Davenport, Geweke, Gregory,

Grimes, Haynes, Hopping, Mann, Marlin, Mason, J. P.; Mason, S. B.; Oldfield, Pickett, Swift and Young.

The minutes of the previous meeting, and the minutes of the meeting of the Executive Committee were read and approved.

On motion, the hearing of delegations requesting the Twenty-second Annual Meeting was made special order of business for 1.30 p. m.

The secretary reported as follows:

To the Board of Directors.

GENTLEMEN: A brief review of the work of the Institute since your last annual meeting will serve to call to mind many things that will tend to show progress.

Soon after the annual board meeting, March 5, 1915, conferences were held in every congressional district. These conferences were well attended, and the delegates were enthusiastic. All counties of the State were represented except Cass, Calhoun, Ogle and Pulaski. Dates for institute meetings were selected and speakers called for in all counties except Cass. Two hundred seventy meetings were scheduled, each covering from one to six days. There were seventy-five State Institute speakers, forty-five University, five State Entomologists, two State Fire Marshals, one State Live Stock Commission and seven State Highway Commission speakers assigned to serve these meetings.

A number of meetings were planned after the annual bulletin was issued; these were in counties that did not send delegates to the district conference, viz: Calhoun and Ogle; and several counties increased the number of meetings, viz: Pike, Lake, Livingston, Hancock and McLean. Several counties changed the dates of their meetings because of the unusual lateness of the corn-husking season, quarantine regulations, etc., causing considerable difficulty in rearranging the itinerary of the speakers, but, taken as a whole, the reports that have been filed to date show better attendance and greater interest than ever before.

Organizations have been effected in two counties that had fallen out of the work the past two years, viz: Calhoun and Union. We still need an effective organization in Cass and Pulaski Counties. This could have been accomplished this season but for the fact that we could plainly see that if all the meetings already planned were held, the fund for supplying speakers would be exhausted and we would have no way of helping them with speakers.

We are pleased to report that we have a live working organization in Cook County which has held nine successful meetings this season after two years of inactivity on account of quarantine and other circumstances over which they had no control.

OUR PUBLICATIONS.

The copy for the Twentieth Annual Report was submitted soon after the close of the fiscal year, as usual, but circumstances over which we had no control greatly delayed the printing, but the issue is now being printed and, we hope, will soon be ready for distribution.

Five thousand copies of the annual bulletin were printed, fourteen thousand copies of the program for the State meeting, also ten thousand flyers advertising the State meeting, were printed and distributed.

Twenty-five thousand copies of the Department of Household Science Year Book have been printed and are now ready for distribution. We have also issued one thousand copies of a booklet on the passing of Ex-President A. P. Grout.

FINANCIAL STATEMENT.

The Legislature appropriated the funds for the use of the Institute in a different manner than has been the custom in past years. The things for which the funds may be expended are itemized, and the items, the amounts appropriated, the amount expended to date and the balance remaining to the credit of each fund is as follows:

	Appropriated.	Expended.	Balance.
For stenographers.....	\$1,000 00	\$ 666 64	\$ 333 36
For janitor and messenger.....	900 00	800 00	300 00
For salary of field workers.....	1,200 00	781 04	418 96
For postage.....	700 00	100 00	600 00
For typewriter, multigraph and photo supplies.....	100 00	26 48	73 52
For towels, water and ice.....	50 00	14 35	35 65
For typewriter.....	90 00	.....	90 00
For express.....	600 00	113 42	486 58
For freight and drayage.....	300 00	8 31	291 69
For telephone service.....	100 00	63 50	36 50
For telegraph messages.....	50 00	36 65	13 35
For reporting and transcript.....	600 00	.....	600 00
For adding machine.....	300 00	300 00	.....
For carpet cleaner.....	20 00	9 00	11 00
For per diem and expenses of speakers.....	6,000 00	5,886 00	114 00
For expenses of officers and members of the board and for district conferences.....	5,000 00	2,102 56	2,897 44
For county institutes.....	7,650 00	5,874 00	1,776 00
For contingency.....	50 00	31 59	18 41
For salary of secretary.....	1,000 00	333 32	666 68
Total funds available on hand.....	.....	.....	\$8,753 14

SUGGESTIONS.

The work of the Illinois Farmers' Institute and the interest in it are increasing so rapidly that calls for literature and speakers are greater than ever before, but the funds for use in supplying the demands do not increase and we are obliged to disappoint many localities where the work is needed, and asked for. It seems that some effort should be made to increase the necessary funds for future use.

Another matter that should have consideration is the fact that there are two systems of agricultural extension work operating in Illinois and while thus far no serious confusions have occurred, yet the work of this office is growing more and more difficult because of this dual system of extension work.

To be more definite: Until the past two or three years practically all of the agricultural extension work in the State was done by the Illinois Farmers' Institute and during the years of its activity it has developed a number of good, practical institute speakers whose services are in demand throughout the State, and many times when we call on them for service in institutes we find they have been engaged by the Agricultural College Extension Department and are not available. That department, backed by large State appropriations and with the assistance of persons in the Government service, will soon be able to take over all of the institute speakers and do all the extension work. For a good many years we have avoided arranging institute meetings for the dates on which the short course is usually held at the University, but during our annual meeting in Harrisburg last year the University Extension Department held a short course in Bond County, and during our annual meeting in Decatur this year a short course was held in Schuyler County; a letter from the Schuyler County Institute secretary informed us that because of this it was difficult to secure persons to attend the State meeting as delegates to assist in the election of district director.

There is a disposition in many counties to have a six days' institute and to expect the State Institute to supply speakers for each day as the University Extension Department does, and as the Institute does not have sufficient funds with which to do this, it is quite natural that the institute speakers accept the University calls. The State Institute has but \$6,000 with which to meet the demands for institute speakers and it seems necessary that the board shall change its instructions in reference to the assignment of speakers to institutes. Heretofore we have been instructed to

assign two speakers to each institute meeting whether local or county, but it has been demonstrated that there are not sufficient funds to supply the increasing demands, and it is suggested that but one speaker be assigned to each one-day meeting, and only two speakers to regular county farmers' institutes, and these to serve not more than two days each.

Another matter to which we wish to call your attention is the growing dissatisfaction because of disappointments in the assignment and service of speakers from other departments. It has been the practice of the Institute to take requests at the district conferences for speakers from the University, the Highway Commission and the State Board of Live Stock Commissioners, and until these departments became strong and practically independent the plan worked admirably. But circumstances have changed and some of these departments do not hesitate to cancel the assignments at the last moment, or to send substitutes who sometimes do not give satisfaction. Then, the Institute, in many instances, is held responsible. We realize that there will always be more or less need for supplying substitute speakers, but the Institute should be held responsible only for changes that are necessary in the assignment of speakers supplied by the Institute and for whose services it is responsible. It is hoped you will investigate this matter and make a ruling.

It should also be understood by all speakers and all Institute workers that no speakers are assigned by the central office except by request of some local person having authority to make the request; that only in cases of emergency where there is not time to secure definite instructions will we undertake to select a speaker for a county or local meeting.

STATE INSTITUTE.

It is perhaps unnecessary to say that the Annual State Institute Meeting was a success, though there were some things learned which the Institute may profit by remembering in the future. I think it has learned that a high school auditorium is not a good place to hold an institute during school hours; and that any church or other building accepted for use of the Institute in the future should be under the complete control of the institute for three days.

The report was discussed, and on motion was placed on file.

TRANSACTIONS OF THE CONVENTION OF DELEGATES, DECATUR, ILL., FEBRUARY 22, 1916.

REPORT OF COMMITTEE ON CREDENTIALS.

To the Convention of Delegates, Illinois Farmers' Institute, Decatur, Ill.

GENTLEMEN: We, your Committee on Credentials, beg leave to report that we have examined the credentials of the delegates representing the various congressional districts and find the following named persons entitled to seats in this convention:

Districts 1 to 10, inclusive. Delegates—R. C. Vial, Peter Lucas, F. N. Hoolen, E. J. Giss, J. E. Barrett, G. S. Brainerd. Alternates—August Geweke, H. E. Young, C. V. Gregory, Geo. White, C. C. Ames.

District No. 11. Delegates—E. B. Heaton, R. T. Morgan, E. D. Spencer, J. P. Putman, J. P. Mason. Alternates—W. C. Evans, Geo. Peck, Henry McGough.

District No. 12. Delegates—Wm. Lutzow, M. Wilcox, C. J. Elliott, J. V. Stevenson, J. Ward Smith, Geo. F. Tullock, Gertrude Moore, Russell H. Coffin. Alternates—E. G. Gryder, Frank Gantzert, Roy Atwood, Louis Belrose, A. M. Pottinger.

District No. 13. Delegates—F. A. Greenawalt, Chas. Moore, Glen Milles, Lloyd Miller, A. H. Lytle, Henry Alford, W. W. Peacock, E. H. Dirksen, J. A. Phillips, A. J. Clarno, Frank Randall, Chas. L. Passmore, John H. Martin. Alternates—James Carmichael, A. W. Brayton, R. W. King, L. A. Herbruck, Oliver Holmes, Chas. Foss.

District No. 14. Delegates—G. W. Pendarvis, J. V. Allaman, Chas. McMillan, M. A. Anderson, E. J. Johnson, H. H. Duncan. Alternates—Wm. C. Bailey, Ross Brimhall, Thos. Stewart, Wm. F. Vance, M. C. Porter.

District No. 15. Delegates—Arthur Brown, D. T. Rauch, J. E. Mum-mert, O. W. Hoit, Perry Mathis, S. P. Neystrom, J. E. Williamson, C. E. Hartsook, David Mathews, Calvin Cain, Samuel Carey, J. W. Whitson. Alternates—John Wertman, A. F. Weber, Geo. S. Barrett, Andrew Hulting, Walter Ott, O. H. Newman, Milton Deatherage, C. J. McMasters, Hugh Greig.

District No. 16. Delegates—C. W. Monier, H. B. Paden, Theodore Ward, Foster Held, A. B. Wright, Elmer Quinn, Jos. F. Ilygh, Duncan McKenzie, L. A. McKean, R. B. Doan, F. M. Patterson, R. W. Carr. Alternates—P. D. Gillham, John C. Sweitzer, D. H. Norton, Conrad Held, Conrad Koch, Archie Williams.

District No. 17. Delegates—Geo. Nimmo, O. M. Kiest, Wm. J. Houston, E. E. Ewing, D. O. Thompson, C. L. Mays. Alternates—A. M. Armstrong, A. H. Mountjoy, John Zeter, E. L. Bill.

District No. 18. Delegates—J. C. Sailor, S. A. Wise, A. J. Gillfillan, Geo. W. Schrader, Henry P. Wright, John S. Collier, Chas. Cunningham, Chas. R. Finley, Geo. S. Hoff. Alternates—J. S. Anderson, B. F. Hislop, John Pierce, Clarence Mann, Souie Goodnecht, C. E. Robinson, A. G. Wood-bury, T. A. Taylor.

District No. 19. Delegates—C. Dyer, M. O. Stover, J. Ray Stanner, Orion B. Goble, M. C. Wortham, J. H. Snyder, Wayne Herrick, Chas. Vance, Philip Rouse, George E. Ewing, John R. Clisby, Claude Roberts, D. E. Britt, Robt. H. Coleman, J. D. Watkins, W. K. Bolin, Geo. A. Fields, Carl Leeds, Geo. Fulk, J. D. Mackey, S. L. Sievers, Jacob A. Lovins, A. H. Storm, John Duncan. Alternates—F. W. Jordon, Pearl Hazen, Geo. C. Gordon, Claude Thorp, W. I. Ziegler, Miss Lottie Johnson, G. S. Tarbox, Joseph Coombe, Thos. Lyons, Henry Shafer, C. L. Taylor, George W. Lehn, Paul D. Cooper, Charles Baker, F. H. Nash, W. O. Nichols, H. G. Storm, R. E. Cecil.

District No. 20. Delegates—O. T. Patterson, Chas. Burgess, J. L. McPhail, John L. Becker, E. S. Armstrong, S. J. Sibley, Jas. G. Burns, Arthur J. Edwards, L. A. Dickson, Chas. E. Warren, J. R. Fulkerson, H. U. Landon, Chas. F. Worner, J. E. VanEttan, J. M. Johnston, W. A. Culver, J. Kennedy Kincaid, E. R. Hembrough, H. P. Joy, Mrs. R. W. Fletcher, F. A. Clark, H. C. McCarrel, Elemer Vortman, Frank Rockwood, James T. Wilson, Chas. E. Himmel. Alternates—W. Dean Mobley, R. Tresmeyer, Chas. Siebenman, John T. Lennazle, Lansing Dickson, E. F. Ford, Edmund Secor, Fred Hanscholter, Ralph Ewin, Geo. Brainard, Fannie Furrer, Geo. H. Wiemer, J. F. Sanman, R. W. Fletcher, Mrs. Nellie Newman, Wm. Krusa, H. C. Knoeppel, F. W. Korty.

District No. 21. Delegates—J. G. Hill, W. S. Scott, Wm. McCluskey, S. R. Winchester, J. W. Hall, W. J. H. Fahrenkrog, John M. Hampton, Martin Bray, H. A. Cress, Louis Staley, Thos. Fish, Jr., E. C. Coulter. Alternates—J. B. Schrantz, C. A. Peabody, Cleve Workman, V. Vaniman, Frank Leach, F. E. Bauer, J. H. Rainey, Wm. R. Acree, Chas. R. Laws, Russell James, Jerome Leland, Ed. Boynton.

District No. 22. Delegates—G. W. Koonce, W. E. McCaslin, Lee S. Dorsey, Henry Henschen, Frank Troeckler, Fred C. Rehling, Geo. Altas, Chas. Rey, H. H. Hartman, J. T. Wilderman, Ben Koesterer. Alternates—John Eade, A. C. Cheatham, J. S. Culp, Adolph Hitz, Frank E. Culp, E. L. Rehling, Rudolph Klein, John C. Gummersheimer.

District No. 23. Delegates—O. L. Wakefield, Smith Kirk, C. H. Musgrove, John A. Craver, John L. Ready, Ben Weber, B. B. Brown, O. E. McCormick, Wm. Muma, E. B. Brooks, R. B. Moss, W. E. McLaughlin, T. J. Holstlaw, Joe Crews, J. I. McCarty, Anton Lahr, Ed Tate, H. N. Woodward, Joe Decker, Frank Britton, Stewart Keneipp, Walter Parkinson, Philip Tohrodt. Alternates—Harry N. Fox, J. B. Muchmore, N. F. Goodwin, W. H. Martin, G. Burrows, Wm. Topp, Chas. Schmock, E. A. Schwarm, August

Yakel, S. A. Harlow, L. N. Beal, N. C. Buer, Eugene Martin, J. C. Howard, Chas. E. Palmer, S. S. Seiler, C. C. Strauser, James Deputy.

District No. 24. Delegates—Fred Reitz, Geo. McElyea, Steve Coal, Pete Rummele, Ed Ransbotton, Joseph E. Rawls, John C. Hall, W. W. Daily, Dr. John B. Oxford, James Patton, Richard Taylor, Geo. W. Moyers, H. G. Maynor, A. H. Floyd, Bertram Abney, Arthur Webber, H. I. Burnett, Geo. Davis, W. A. Stallings, E. A. Rankin. Alternates—J. H. Gammon, Wm. Kurr, D. J. Underwood, J. F. Garvin, C. A. Bowers, F. H. Staubitz, Theo. S. McCoy, Henry Bath, Otto Baker, Bluford Durham, John Naugle.

District No. 25. Delegates—Robert Lambert, D. G. Fitzgerald, E. W. Mundell, C. A. Sanders, H. G. Easterly, J. P. Gilbert, H. B. Piper, W. R. Pier, Matt Robb, Grant Keith, N. R. Lessley, F. H. McKelvey, A. H. Wiltshire. Alternates—H. H. Webb, J. R. Midyett, S. W. Jones, Fremont Erwin, Willard Robb, Edw. Hart, H. P. Roberts, W. M. Beattie, Louis Jergens.

[Signed] E. W. BURBOURGHS,
A. V. SCHERMERHORN,
WM. H. ASHDOWN,
Committee.

Report unanimously adopted.

REPORT OF DELEGATES.

The delegates representing the odd numbered congressional districts held their elections and reported to the convention the election of directors for the ensuing term as follows:

- 1st District—H. E. Young, Chicago.
- 3d District—Merrill K. Sweet, Glenwood.
- 5th District—C. V. Gregory, Chicago.
- 7th District—Chas. Gray, Chicago.
- 9th District—Clayton C. Pickett, Chicago.
- 11th District—J. P. Mason, Elgin.
- 13th District—A. N. Abbott, Morrison.
- 15th District—Frank S. Haynes, Geneseo.
- 17th District—S. B. Mason, Bloomington.
- 19th District—J. B. Burrows, Decatur.
- 21st District—Edward Grimes, Raymond.
- 23d District—Chas. E. Palmer, Noble.
- 25th District—H. M. Aiken, Benton.

Directors for the second, fourth, sixth and eighth congressional districts were appointed for a term of one year, as follows:

- 2d District—August Geweke, Desplaines.
- 4th District—P. R. Barnes, Chicago.
- 6th District—R. C. Vial, LaGrange.
- 8th District—Jas. R. Clark, Chicago.

The ex officio directors are:

- Superintendent of Public Instruction—F. G. Blair, Springfield.
- Dean of the College of Agriculture—Eugene Davenport, Urbana.
- President State Board of Agriculture—Len Small, Kankakee.
- President State Horticultural Society—W. S. Perrine, Centralia.
- President State Dairymen's Association—J. P. Mason, Elgin.

On motion, the election of directors was unanimously approved and the convention adjourned.

Respectfully submitted,

H. A. McKEENE, *Secretary of Convention.*

Director Abbott introduced the following resolutions and moved their adoption:

Resolved, That the secretary and the directors be and hereby are instructed, at the district conferences, to call attention to the tendency to overload programs, and recommend that not to exceed two speakers be on the program of each session; and, be it further

Resolved, That the president of this board, Dean Davenport, and Secretary McKeene be directed to prepare a model program to be submitted to the county institute officers.

The resolutions were unanimously adopted.

Dr. Davenport, chairman of the Committee on Agricultural Books recommended that the following publications be added to the list of those heretofore recommended by the committee:

"Social Justice."—Carver, Harvard Press.

"Farm Structures."—Ekblau, McMillan.

"The Essentials of Agriculture."—Waters, Ginn Co.

"Feeds and Feeding."—Henry & Thompson, By Authors, Madison, Wis.

"Productive Feeding of Farm Animals."—Wool, Lippincott.

"At the Sign of the Stock Yards' Inn."—Sanders, Sanders Pub. Co.

"Projects Based on Community Problems."—Burton, Vocational Supply Co., Indianapolis.

"Rural Credits."—Herrick, Appleton Co.

"George Washington Farmer."

"Happy Hollow Farm."—Wm. R. Leighton.

On motion, the recommendation was approved.

Director S. B. Mason, chairman of the Committee on Household Science, reported as follows:

The meeting of the Household Science Committee was held in the Institute rooms at 8.00 o'clock a. m.

Present: Messrs. Mason, Swift, Grimes, Ashdown and Mrs. J. C. Hessler from the Department of Household Science. Meeting was called to order by Chairman S. B. Mason.

The resolutions as passed at the meeting of the Department of Household Science at Decatur were read and discussed.

A motion was made by Mr. Grimes that this committee recommend a Conference of our Household Science Workers, to be held at or during the time of the next State meeting. Motion carried.

The question of holding a "Baby Conference" at the next meeting was referred to the Executive Committee.

A motion was made by Mr. Swift that the committee recommend that the officers of the Household Science Department outline a uniform course of study for household science clubs throughout the State. Motion carried.

Mr. Mason spoke of the necessity of outlining a definite constitution for the future use of the Department of Household Science and presented the following:

WHEREAS, The representation of delegates in the annual meeting of the Household Science Department of this Institute and its increasing activities have outgrown the constitution and rules heretofore adopted for its management, leading to a possible confusion in its future management and status with the board of directors; therefore be it

Resolved, That said constitution be revised as follows:

CONSTITUTION OF DEPARTMENT OF HOUSEHOLD SCIENCE.

(As revised by Joint Committees of the Department and of the Board of Directors, and approved by the Board of Directors, March 3, 1914, revised again March 7, 1916.)

ARTICLE I—NAME.

SECTION 1. The name of this organization shall be "Department of Household Science, Illinois Farmers' Institute."

SEC. 2. This department shall be affiliated as an auxiliary, with the Illinois Farmers' Institute and shall be under the control and subject to such regulations and limitations as shall be prescribed by the board of directors.

ARTICLE II—OBJECTS.

SECTION 1. The object of this department shall be to work in harmony with the Illinois Farmers' Institute and county and local farmers' institutes throughout the State of Illinois, along all lines in which they are interested; it shall encourage and assist in the organization of local household science

departments and clubs in every county, whose duty it shall be to cooperate with the county farmers' institute in arranging programs and exhibits for the meetings, and to encourage the young people to become interested and take part in the institute and department work.

SEC. 2. It shall endeavor to stimulate interest in all that pertains to home making and housekeeping; encourage the organization of Parents and Teachers' Clubs in school districts, Domestic Science Clubs and Mothers' Clubs wherever possible, for the study of the problems of the home and school, and withal, to labor for the introduction of the study of household science and art into our educational system.

ARTICLE III—MEMBERSHIP.

The membership shall consist of county household science clubs affiliated and cooperating with the county farmers' institute, and of other local clubs which are actively engaged in household science study and work. Membership shall be limited to those clubs which are in actual affiliation with the Farmers' Institutes and whose activities shall have included at least six meetings during the year, in which meetings the major part of the program presented shall have consisted of topics pertaining to household science. All clubs to be affiliated must have expressed a desire to affiliate with the State Farmers' Institute and shall report to the secretary of the Department of Household Science the name of the club, the names of its officers, the number of members and such other information as shall be required of them.

Household science work shall be defined as holding meetings, forming classes of girls in household science, in forming canning clubs or in furthering such other activities as are recommended by the executive committee of the Household Science Department.

ARTICLE IV—ANNUAL MEETING.

The Department of Household Science shall hold an annual meeting at the same time and place as the Illinois Farmers' Institute.

ARTICLE V—DELEGATES.

Delegates to the annual meeting shall be selected by each county or local club in such manner as they may determine at a regular meeting of said club. The representation shall consist of two delegates from each county organization and two delegates from each local club recognized by and affiliating with the county farmers' institute or local institute, and credentials signed by the president and secretary of such county or local club shall be their credentials in making up the roster of delegates to the State meeting; provided that if any county shall fail to elect delegates or there shall be no household science club affiliating with the farmers' institute in that county, then the president of the county farmers' institute shall appoint two women who may represent the county at the State meeting.

SEC. 2. Nothing in this constitution shall be so construed as to prevent any woman in Illinois from attending all sessions of the department meetings or taking an active part in its discussions, but none but duly accredited delegates shall have a vote in its management.

ARTICLE VI—OFFICERS.

SECTION 1. The officers of this department shall be: a president, a vice president, a second vice president and a secretary; the secretary shall be elected by the board of directors.

SEC. 2. The duties of the officers shall be such as usually devolve upon such officers. The duties of the secretary will be to conduct the affairs of the office as is usually done, under the direction of the board of directors of the Illinois Farmers' Institute. The salary of the secretary shall be such an amount as may be fixed by such board of directors.

SEC. 3. In the discharge of their duties, the officers and executive board shall be guided by Roberts' "Rules of Order."

ARTICLE VII—ELECTION OF OFFICERS.

SECTION 1. The president, first vice president and second vice president of the Household Science Department of the Illinois Farmers' Institute shall be elected at the annual meeting of the department, held at the same time and place, and in connection with the State meeting of the Illinois Farmers' Institute.

Candidates for the office of president, first vice president and second vice president shall be placed in nomination by a committee on nominations of five women, who shall be named by the president of the Illinois Farmers' Institute.

ARTICLE VIII—EXECUTIVE COMMITTEE.

SECTION 1. The president, first vice president and second vice president of this department shall constitute the Executive Committee of the Department of Household Science and shall act in an advisory capacity to the Household Science Committee of the farmers' institute and the board of directors of the Illinois Farmers' Institute.

SEC. 2. The duties of the Executive Committee shall be to plan the work of the department for the year, recommend the use of funds of the department, and submit a written report of its proceedings to the board of directors of the Illinois Farmers' Institute.

A motion was made by Mr. Grimes that the committee recommend to the board of directors, the adoption of the constitution as a whole. Motion carried.

The minutes of the convention of delegates held at Decatur, February 23, were read and a motion was made that the Household Science Committee recommend the minutes of the convention be approved by the board of directors. Motion carried.

A motion was made by Mr. Swift, seconded by Mr. Ashdown that Mrs. H. A. McKeene be recommended to the directors as secretary for the coming year. Motion carried.

No further business appearing meeting adjourned.

Reports of committee unanimously adopted.

Mrs. H. A. McKeene, secretary of the Department of Household Science presented the following report:

Another year has passed and it is not only a duty but a pleasure which comes to your secretary to review some of the work accomplished by our department.

Never in our history has more effective work been done by our speakers and county departments, and clubs all over the State have done "effective" work. Women are realizing that there is no greater gift bestowed upon them than that of being true home makers.

No women can be called to any higher mission than the making of a home nor to the study of anything in the higher education more important than the science of right living. The spirit that is engendered by right living in the home is the spirit that will conquer the world.

It is important that we keep the object for which we are organized in mind and I quote from the Institute records:

"This department shall be affiliated as an auxiliary with the Illinois Farmers' Institute.

"The object shall be to work in harmony with the Illinois Farmers' Institute and county institutes throughout the State of Illinois along all lines in which they are interested; it shall encourage and assist in the organization of local household science departments and clubs in every county whose duty it shall be to cooperate with the county farmers' institute in arranging programs and exhibits for the meetings and to encourage the young people to become interested and take part in the institute and department work."

The organization work the past year has been wonderful and we have added since the Harrisburg meeting, ninety-five names to our list. At Harrisburg we had 300 clubs enrolled and to-day we have 395, making 1915 the banner year in point of club growth.

May I add that a majority of the new clubs are rural, and that means reaching out into all parts of our great State. Every new club has been supplied with sample programs, outlines of study, Year Books, letters of instruction, and a hearty welcome extended; also a further correspondence with the officers, assuring them of our willingness and desire to assist in every possible way to make the meetings successful.

The Institute exhibits the past year have meant more than mere contests for prizes or a show of fancy work, canned goods and cakes. They have been made to encourage the making of better products in each line and an education to the exhibitors in showing them the qualities that make for excellence, and also to show the general public the how and why certain displays were awarded premiums. Unless these points are clearly brought out, an exhibit is of little consequence.

Our department recommends the young women for the State Fair School, which has become so popular. Last year 400 State Fair School reports and 75 applications and letters were sent out from our office. Many of the young women have given excellent reports at the county institutes and have become members of a household science club in their community. The cooperation of the State Fair School Board and our department has been worthy of mention.

Through the mothers' clubs which affiliate with our organization, many helpful things have been done to bring the school and home closer together and "the school lunch" and "child welfare" are subjects which have been used often.

The department library has grown the past year, for 150 new books have been added and a new catalog has been made and sent to every club. Not only has the library grown by the addition of books, 218 volumes have been used in the field since last February.

Besides the books sent for club use, sets of clubs helps have been distributed and information on many questions has been given, upon request.

A glance through the "Field Reports" in the Year Book will give you an idea of what each organization has accomplished and I will not speak of various lines of work in this brief report.

Through the courtesy of the Department of Household Science of the University of Illinois and Illinois Farmers' Institute, sixty-seven scholarships in the University of Illinois were given to young women. These scholarships make it possible for the girls to enter the University of Illinois for a four years' course in household science with tuition free.

When the conferences were held last April, speakers were assigned for the season at the request of the delegates in attendance and it may be interesting for you to know that there were 549 women's sessions scheduled with thirty-two speakers assigned. Of this number nine University speakers appeared before fifty-eight sessions and twenty-two Institute speakers for 491 sessions.

Twenty-five thousand copies of the 1914 Year Book which was ready for distribution last February have been sent out (only 1,500 on hand for new organizations). The 1915 Year Book which is just coming from the press was compiled and edited by the secretary.

Three thousand, three hundred, seventy-five personal letters, 1,100 bulletin No. 22 and other bulletins, 750 fly circulars, 1,500 canning recipes, catalogs and magazines, 1,700 library catalogs, 4,500 score cards, a list of 1,000 names to agricultural papers (upon request), 220 sets of club material to individual officers, 400 sets of speakers demonstrations of food recipes were sent out. Many things are not recorded, nor could we do so for lack of time.

The states requesting material from the office and to which it has been sent are: Pennsylvania, Missouri, Oregon, Washington, Indiana, North Dakota, South Dakota, Louisiana, South Carolina, Florida, Iowa, Kansas, Vermont, Tennessee, Nebraska, New York, Charlotte, Prince Edward Island, Kentucky, Maryland, Colorado, Oklahoma, New Jersey, Idaho, Arkansas, California, Georgia, so our literature not only reaches Illinois women, but from the east to west and from north to the south of the United States.

Many states write "That literature from your department is used by the extension workers and copies of the Year Books are kept in the school rooms for reference books."

The following subjects have come to the office and information was sought by your secretary and forwarded to the persons making inquiry:

"Adulteration in canning," "trees," "meat," "roll call hints," "gelatine," "poetry," "summer vacation," "banquet helps," "mothers' day," "consumers' league," "Clara Barton," "red cross," "adulterations in candy making," "salads," "salt," "fireless cookery," "water in cooking," "how to keep cool," "origin of names of common foods," "home and school," "community church," "summer housework," "summer vacation," "20th century farmer," "farmers' recreation," "how to live within your income," "crisco," "school lunch," "oysters," "potatoes," "noted Illinois women," "Christmas cooking," "deep fat cooking of meat," "deep fat cooking of pastry," "cooking of nitrogenous foods." Is not this a little proof that our women are thinking along many lines?

The banner counties for new organizations the past year are Iroquois and Pike, each reporting six.

Ten thousand pieces of mail advertising the Decatur meeting have been sent to our organizations. Your secretary has been asked to assist the directors in weak counties, also to attend Institute meetings and visits were made to thirteen clubs and eleven institutes. Among these engagements twelve new clubs were included.

In all of our department work we plead for better homes in Illinois. We realize that the homes can do a work which schools and churches cannot, but all must stand together. With right homes we will have right schools, churches and communities, and all of this will mean a better future citizenship.

"Every woman in Illinois standing together to make the best home better" is a slogan which our department might think about for the coming year."

VALUE OF HOME.

"A home is worth all the money
That the wealthiest man can raise;
A home is worth more than it costs him,
No matter how much he pays;
That is, if it's really home-like—
A place where contentment is,
And where he is glad to linger
With all that is truly his."

Your secretary cannot close this brief report without an expression of appreciation to every one who has cooperated in making the work a success and for all kind words which have come to the office.

This great work accomplished is "ours" and not for self gain, but, for a better Illinois.

On motion the report was approved.

Mrs. J. C. Hessler, president of the Department of Household Science, addressed the board on the future work of the department.

On motion, recess was taken to 1.15 p. m.

AFTERNOON SESSION.

The board convened at 1.15 p. m., when the transactions of the convention of delegates were read and approved.

The roll was called and those present were: Abbott, Allen, Ashdown, Barnes, Blair, Burrows, Burroughs, Geweke, Gray, Gregory, Grimes, Haynes, Hopping, Mann, Marlin, Mason, J. P., Mason, S. B., Palmer, Pickett, Swift, Tullock, Vial, and Young.

Delegations from Charleston, Greenville, Kankakee, and Streator were heard and the matter was taken under advisement for later discussion.

After a recess of ten minutes during which time, members of the board visited with the delegations, the board was called to order and the first order of business was the election of officers.

The president appointed Directors J. B. Burrows, and H. E. Young tellers and the election proceeded in due form resulting in the unanimous election of officers as follows:

President, Geo. F. Tullock, Rockford.
 Vice President, D. M. Marlin, Norris City.
 Secretary, H. A. McKeene, Springfield.
 Treasurer, J. P. Mason, Elgin.
 Auditor, F. I. Mann, Gilman.

On motion the salary of secretary and field worker of the Department of Household Science was fixed at one thousand dollars (\$1,000) per year.

On motion, Mrs. H. A. McKeene was elected secretary and field worker of the Department of Household Science for the ensuing year.

On motion, \$150 was appropriated from the general fund for use in holding Farmers' Institute meetings in the first nine congressional districts in Cook County.

Director Burroughs, chairman of the Committee on Highways, reported as follows:

Since the Tice Road and Bridge Law went into effect two and one-half years ago, there has been built in the State at the close of the last calendar year, 115 miles of State aid roads of which 90.5 miles are of concrete, 22.5 miles are of brick, 1.2 miles of gravel and 1 mile of macadam. There were also constructed 81 bridges up to this time under the provisions of the State Aid Law. The total cost of this road and bridge construction was \$1,497,407, which was shared equally by the State and counties.

The State Highway Department also supervised, in 1915, the building of 82 miles of township roads. These roads were paid for by the townships by means of some special tax or by bonds. The State Highway Department assumed supervision of the construction; loaned to the township the road machinery owned by the State; and sometimes furnished a man to operate some of the machinery. In many cases, stone for these roads was furnished free to the township from the quarries at the two State penitentiaries.

The Legislature, in 1915, appropriated \$2,000,000 for State aid work for the biennium 1915-17, \$1,000,000 of which became available last July. This money was allotted to the various counties in proportion to their road and bridge tax and was met by a like amount from the counties, thus making available \$2,000,000 for road work from July 1, 1915, to July 1, 1916.

The State Highway Department estimates that there will be about 470 miles of State aid road constructed this year, divided as to types, as follows:

Brick, 11 miles; Concrete, 58 miles; Gravel, 22 miles; Water bound macadam, 5 miles; Bit. macadam, 6 miles; Oiled earth, 250 miles; Plain earth, 120 miles.

The amendment to the Road and Bridge Law passed by the 1915 Legislature permits the counties, if they so desire, to issue bonds to secure funds for the immediate improvement of their designated State aid routes instead of building each year only the amount possible with the money allotted by the State, together with the amount furnished by the county. In case a county issues bonds for the purpose of building State aid roads, the law provides that the allotments from the State, if met with a similar amount by the county, can be used in paying off the principal of these bonds.

Vermilion County was the first county in Illinois to issue bonds for the improvement of rural highways, the amount issued being \$1,500,000. Cook County has issued \$2,000,000 in bonds for roads.

The enthusiasm for this plan of financing the construction of State aid roads is growing every day. There are about thirty counties contemplating bond issues for road improvement, the total amount involved being about \$20,000,000, ten times the amount appropriated by the last Legislature for road work for the biennium.

On motion the report was placed on file.

Director F. G. Blair gave a verbal report of the work of the office of Superintendent of Public Instruction on "Good Roads Day" and also on "Corn Day" in the public schools of the State and asked the support of the Farmers' Institute in that work.

Director Mann, chairman of the Committee on Entomology reported progress of the work of that committee in planning the destruction of the chinch-bug and the San Jose scale. He said that the State Entomologist was planning to enforce the law in reference to the spraying the scale, or destroying the orchards infested by it.

Director Allen, chairman of the Soil Investigation and Experiment Committee, gave an extended report of that committee as follows:

On December 14, 1915, a meeting of the committee was called in Dean Davenport's office, University of Illinois, with the following members present: Ralph Allen, J. P. Mason and A. N. Abbott, together with C. G. Hopkins, J. G. Mosier, A. L. Whiting, Robert Stewart, F. W. Garrett, and E. VanAlstine. Dean Davenport was also present during part of the session.

Prof. Mosier presented the following report on the progress of the soil survey and the experimental work of the division of soil physics.

STATE SOIL SURVEY.

Total number of counties surveyed to date.....	59
Number of parties surveying and an extra one during summer vacation	4
Total area surveyed.....	34,206 square miles
Per cent of State surveyed.....	61.08
Total area surveyed during the past year.....	3,356 square miles
Reports published to date.....	11
No. 1. Clay County.	No. 7. McDonough County.
No. 2. Moultrie County.	No. 8. Bond County.
No. 3. Hardin County.	No. 9. Lake County.
No. 4. Sangamon County.	No. 10. McLean County.
No. 5. LaSalle County.	No. 11. Pike County.
No. 6. Knox County.	
Reports in hands of printer, Winnebago.....	1
Maps completed, Kankakee.....	1
Maps in lithographer's hands.....	8
No. 1. Tazewell County.	No. 5. Kane County.
No. 2. Edgar County.	No. 6. Whiteside County.
No. 3. Dupage County.	No. 7. Johnson County.
No. 4. Cumberland County.	No. 8. Edwards County.
Maps to be prepared and placed in lithographer's hands during the winter	8
No. 1. Hancock County.	No. 5. Dekalb County.
No. 2. Saline County.	No. 6. Peoria County.
No. 3. Iroquois County.	No. 7. McHenry County.
No. 4. Bureau County.	No. 8. Champaign County .
Maps not published furnished to county agents last year.....	4
No. 1. Dekalb County.	No. 3. Champaign County,
No. 2. Mason County.	No. 4. Peoria County.
Counties completed during the past year.....	6
No. 1. White County.	No. 5. McHenry County.
No. 2. Crawford County.	No. 6. Livingston County.
No. 3. Champaign County.	(Practically completed.)
No. 4. Douglas County.	

SOIL PHYSICS EXPERIMENT FIELD AT VIENNA.

This field has been in the possession of the University for ten years, and no treatment has been applied except limestone, crop residues and manure on part of the series. With this treatment it is very likely true that the yields have about reached their limit.

A change has been made in the plan of the experiments in which the best methods that have been developed in preventing washing will be continued, but a different rotation and soil treatment has been planned. The

rotation adopted is: corn, cowpeas, wheat, clover and timothy, a five year rotation. Residues or the equivalent in manure will be used on all plots except No. 7. Rock phosphate will be applied to No. 2 and 5, and acid phosphate to Nos. 3 and 6. No. 7 will receive limestone only, and all crops will be removed.

New implements have been purchased and a new barn built on this field.

ROLAND PLOTS—PEAT-MANURE EXPERIMENT.

The object is to compare peat and manure in different amounts and a compost of the two. The rotation is: Corn, oats, clover and wheat. All plots receive standard fertility treatment, which consists of two tons of limestone and one ton of rock phosphate during the rotation.

Plot 1. Ten tons manure.

Plot 5. Peat $2\frac{1}{2}$; manure $2\frac{1}{2}$.

Plot 2. Ten tons peat.

Plot 6. Check.

Plot 3. Check.

Plot 7. Manure 5 tons.

Plot 4. Peat $2\frac{1}{2}$; manure $2\frac{1}{2}$; com-
posted.

Plot 8. Peat 5 tons.

URBANA FIELD—CULTIVATION EXPERIMENTS.

This experiment will be similar to the old one on the 600 series south of the Horticultural greenhouses with the exception that irrigation and no plowing will be dispensed with. Plots 1, 3 and 5 receive no treatment, while plots 2, 4 and 6 receive standard fertility treatment. Stalks and stubble remain on the ground and the manure equivalent of the crops removed is to be returned. The rotation will be: Corn, corn, oats and clover.

RESIDUE EXPERIMENT.

The object of this experiment is to study the effect of residues on the yields of crops, moisture, temperature, aeration and granulation of the soil, and draft of plows and other implements. The rotation is corn, oats, clover and wheat.

TOLEDO FIELD.

At the Toledo field a comparison of ordinary plowing with subsoiling by dynamite, deep tilling with the Spaulding deep tilling plow, and subsoiling with the ordinary plow is made. The rotation is: Corn, soy beans, wheat and clover.

The following report on the work of the soil analysis was then presented by Prof. E. VanAlstine:

During the last year, analytical work has been mainly on Vermillion, Dewitt, Scott, Monroe and Iroquois Counties.

There are 590 soil samples from these five counties, and while there is still some analytical work to be done on Iroquois County samples, enough work from other counties has been done since January 1 to bring the total number of samples completely analyzed up to about 618.

Including the eleven counties for which reports were published, one, the report for which is in press, and one soon to be sent to press, analytical work has been nearly completed on 41 counties. How much work there is yet to be done on these cannot yet be determined until the work of revising the maps has been completed and any necessary extra samples collected. It is undoubtedly safe to say, however, that enough work has been done on the samples from other counties to equal the work yet to be done on these 41 counties.

The analysis has been kept up fairly close to the collecting until this year. During this season soil has been collected in 529 places, or, as we speak of it, there have been collected 529 sets, a total of 1,556 samples. These are from 27 different counties, but mainly from Macon, Shelby, Cook, Dekalb, Douglas, Peoria, Henderson, Franklin, Champaign, McHenry and White, eleven counties which were sampled completely so far as possible at the time.

As at present planned, the work for the coming year will be mainly on Dupage, Dekalb, Peoria, McHenry, and Champaign Counties, from which we have 619 samples. These and the samples yet to be analyzed to complete the

work on counties already started will be all we can expect to finish during the next year.

One hundred and twenty-five limestone samples have been received during the year. These have been analyzed and reports as to their carbonate content made to the ones from whom they were received.

Our plan is to analyze for carbonates, samples of limestone that come from places where it seems that small crushers might be installed, samples from beds of limestone which, if opened up and worked, might be of benefit to the farmers of that community. There are many places in the State so far from railroads, or so located in respect to large quarries where it is impossible for farmers to get limestone on their land without considerable expense. In such communities, it seems that the station should furnish the necessary information regarding limestone deposits of any considerable size that may be near and suitable for their use.

Dr. Hopkins reported that only one new field had been put out during the last year. This is at Sparta, Randolph County. This field has been deeded to the University by citizens of Sparta and the community, and work will be started on it next year. The field at Momence, Kankakee County, which is not on typical deep peat soil, will be given up this fall. This field is located in the center of a large farm, has been leased, and the data which we have from it is sufficient for the kind of soil.

Mr. Garrett reported that the results this year from the experiment fields showed up well the effect of soil treatment, both in yield and in the quality of grain. The corn on phosphorus treated plots was solid and good, while that from other plots was soft and inferior. Limestone did not seem to improve the quality of corn.

Dr. Hopkins explained the construction of the soil bins, located at the Experiment Station, Urbana.

These bins consist of a series of cement tanks or boxes sunk in the ground and filled with earth taken from the excavations, each layer of earth being replaced in the same order in the bins as it was taken from the ground.

The bins are one rod square and eight feet deep, and made water-tight. Drainage is provided by means of a tile at the bottom and also one four feet from the surface. Provision is made for collecting the drainage water. The object of using these bins is that more complete knowledge may be gained of the soil than is possible in field experiments.

The soil was removed in strata, each stratum being put by itself, the bins were constructed, and after much care and labor made water tight. When refilled, the soil from each stratum from all of the bins was mixed. The surface 21 inches, divided into three seven-inch layers, have not yet been returned. After the bins had been filled as at present, they were flooded with water and allowed to settle. It is hoped that by spring the soil will be so thoroughly settled that the upper tile, which are to be four feet from the surface, may be put in without danger of their settling out of place.

The rotation planned for these bins was the same as that on the plots east of Mathews Avenue, wheat, corn, oats and clover in rotation on four plots, with alfalfa on the fifth plot, alfalfa being changed every fifth year to another plot. This rotation was agreed to by the committee and after some discussion it was agreed that the same rotation should be followed on the three sets of bins not included in the first or regular series. While every crop will not be represented here every year, the crops which are represented each year will be the same as those in adjoining bins of the regular series, and, until the treatment is varied for special study, will be directly comparable with them.

One of these bins will be left untreated as a check, and two other bins will receive burned lime and acid phosphate, respectively, for comparison with ground limestone and rock phosphate used as standard applications on the regular series. This will leave three extra bins with standard treatment as duplicates of the regular series. These can then be used to replace any of the regular series bins that may prove to be irregular and unsatisfactory. In case such necessity does not arise, these three bins, after a time, may be

used for studying the results of some other treatment. As such an extra treatment to be studied, Dr. Stewart suggested the use of gypsum on one of the bins. The effect of gypsum in addition to limestone and rock phosphate could thus be studied. It will perhaps be necessary to place a wire screen around and over the bins to protect them from birds and burrowing animals.

Attention was then turned to the work of the soil biology division and Dr. Whiting presented the following report:

The investigations conducted by the division of soil biology during the last year have been chiefly along two lines:

1. A study of the solubility of rock phosphate due to the action of the nitrate bacteria.

2. Determination of available nitrogen as nitrate and ammonia in the field, greenhouse and laboratory.

The first investigation which is now under way, is concerned with the question: "Can the action of the nitrate bacteria (these bacteria oxidize ammonia into nitrite), which form acid and must have a base to neutralize it, be neutralized by the calcium of the rock phosphate?" It will easily be seen that if this is true, then, phosphorus will be made soluble.

Practically, it is known that rock phosphate is made soluble by being placed in contact with decaying organic materials.

The relation of the nitrogen requirement of a crop, to that of its phosphorus requirement, is of practical interest in this connection.

A 100-bushel crop of corn requires 6.51 times as much nitrogen as phosphorus. When the acid produced by the nitrite bacteria is neutralized by rock phosphate, two of the calciums of the three in the rock, unite with the nitrogen, and the other one goes with the phosphorus to make soluble acid phosphate. As a result, there would be over seven times as much phosphorus made soluble as a 100-bushel corn crop would use. This is the problem with which we are working and the study may be extended to other elements such as potassium.

(Later, the bulletin, No. 190, relating to this work of the soil biology division, presented by Dr. Whiting, has been published. The foreword in this bulletin, written by Director E. Davenport, expresses the value of this experiment and the place it occupies in the line of fundamental discoveries and is, for this reason, included in this report, together with the summary of the bulletin.)

"The fundamental facts of soil fertility and crop production are slowly but surely becoming established, and the farmer has begun to shape his agricultural practice by the discoveries of science. Of these discoveries the following may be fairly called fundamental.

1. The fact established by Senebier of Switzerland that the carbon of crops is derived from the atmosphere and not from the soil.

2. The work of DeSaussure which clearly demonstrated that mineral elements are essential to plant growth.

3. The work of Lawes and Gilbert showing that farm crops are unable to take the nitrogen from the atmosphere through the leaf.

4. The experiments of Atwater and Woods establishing the fact that leguminous crops are in some way able to utilize atmospheric nitrogen.

5. The experiments of Hellriegel establishing the fact that the principal agents in the fixation of atmospheric nitrogen are certain bacteria growing upon the roots of leguminous plants.

6. Investigations at the University of Illinois concerning the amounts of nitrogen which may be brought into the soil by means of these bacteria, under field conditions. (See Ill. Agr. Exp. Sta. Buls. 76 "Alfalfa on Illinois Soil;" 94 on "Nitrogen Bacteria and Legumes;" 182 "Potassium from the Soil.")

7. Later experiments by the University of Illinois concerning the availability of natural sources of mineral plant food in permanent agriculture. (Ill. Agr. Exp. Sta. Buls. 76, 94, and 182.)

"The purpose of the experiment herein reported was to determine whether the farmer supplying nitrogen to his soil in the form of organic matter could depend upon its decomposition to render soluble the finely

ground rock phosphate, and so maintain the necessary supply of available phosphorus. This probably has long been suspected by the University, and the results reported seem to indicate conclusively that in the presence of liberal applications of finely ground rock phosphate such solution may be depended upon. This discovery ranks in importance with the inoculation of legumes and with the determination of the amount of atmospheric nitrogen that can be fixed by leguminous crops.

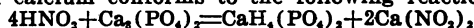
"When we remember that chemistry as a science dates practically from the time of the American Revolution, when King George was more interested in better agriculture for England than in quieting his turbulent colonies, and when we recall that the great science of bacteriology has entirely developed since the time of our Civil War and the abolition of slavery, it is evident that rapid progress is being made in the establishment of farming on a truly scientific basis, and that slow as discovery seems to be, it is after all relatively rapid." E. Davenport, Director.

SUMMARY OF BULLETIN NO. 190.

1. Nitrite bacteria make phosphorus and calcium soluble from insoluble phosphates when they oxidize or convert ammonia into nitrite. (Page 401.)

2. The actual ratio found shows that about one pound of phosphorus and two pounds of calcium are made soluble for each pound of nitrogen oxidized, aside from the action of the acid radicles associated with ammonia. (Page 402.)

3. The ratio of solubility found on the basis of nitrogen to phosphorus and calcium conforms to the following reaction:



According to this equation, 56 pounds of nitrogen liberate in soluble form 62 pounds of phosphorus and 120 pounds of calcium. (Page 403.)

4. Plants are important factors in the liberation of phosphorus, owing to the production of carbon dioxide and the removal of the soluble phosphorus produced by the bacteria. (Page 404.)

5. Neither ammonia-producing bacteria nor nitrate bacteria liberate appreciable amounts of soluble phosphorus from insoluble phosphates. (Pages 398, 403.)

6. Other acid-producing bacteria make phosphorus soluble from insoluble phosphates according to the nature and amount of the acid produced. (Pages 403, 405.)

7. A comparison of the amounts of nitrogen, phosphorus, and calcium required by farm crops, with those possible of solution by biochemical action, shows possibilities far beyond the plant requirements; which leads to the conclusion that plenty of rock phosphate in contact with decaying organic matter must give the plants an excellent opportunity to obtain both phosphorus and calcium as well as nitrogen. (Page 405.)

The second investigation is being conducted on the Davenport Series on the North Farm. This year the surface soil of series 400 and 200, plats 1, 2, 3, 4, 6 and 10 have been analyzed for ammonia and nitrate. In general the results show from 10 pounds of ammonia on the 200 series to 20 pounds of ammonia on the 400 series. The nitrate averages on the 400 series, on which corn was growing, 31.6 pounds per acre, on the 200 series, where winter wheat was growing, 29.2 pounds per acre.

Ammonia production on either series was not influenced by treatment except in excess.

Nitrate production was decidedly influenced by treatment.

The results, while representing only one year's work, show that there is plenty of nitrate nitrogen present and to have applied nitrogen as nitrate of soda to either of these crops would have resulted in throwing away the money invested.

In the greenhouse and laboratory, green clover is being compared with dry clover in its decomposition and change into nitrate nitrogen. Another experiment which may be of interest is concerned with the storage of soil for inoculation.

Soil was collected where cowpea, soy bean, clover, alfalfa and vetch grew and possessed nodules in 1915 and treated as follows:

1. Stored out of doors.
2. Stored in greenhouse. (Dry.)
3. Stored in greenhouse. (Moist.)
4. Sterilized and inoculated with bacteria from these legumes; then sealed and placed in the attic to test how long the bacteria would live in the soil.

Respectfully submitted,

RALPH ALLEN, *Chairman*,
A. N. ABBOTT,
C. V. GREGORY,
J. P. MASON,
FRANK I. MANN,

Committee.

On motion, the report of the committee was approved and placed on file. Director Pickett, chairman of the Auditing Committee reported as follows:

We have examined the books of the secretary and compared cancelled warrants therewith, finding same to be correct and the books in excellent condition.

Total appropriation	\$25,710 00
Total expenditures	16,926 91

Balance	<u>\$8,783 09</u>
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Outstanding warrants	\$5,700 55
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On motion the report of the committee was approved and placed on file.

The list of speakers was revised and several names of persons who have left the State were ordered dropped, and several names were ordered added to the list.

On motion, the president was authorized to appoint a committee of which the president of the Illinois Farmers' Institute shall be ex officio member, to organize and conduct the work of the Illinois Agricultural Hall of Fame.

The president appointed Directors Abbott, and Allen to serve on this committee.

Director Allen offered the following resolution and moved its adoption.

Resolved, That the secretary be instructed to secure photographs of all past presidents of the Illinois Farmers' Institute, have them enlarged, framed and hung upon the walls of the Institute rooms.

Motion unanimously adopted.

Board adjourned to meet at the call of the president.

MINUTES OF MEETING OF EXECUTIVE COMMITTEE, STREATOR, ILL., MAY 25, 1916.

The Executive Committee met in the Plumb Hotel, Streator, Ill., at 10:00 a. m., May 25, 1916, pursuant to the call of President Tullock, with all members present.

The president and secretary of the Streator Commercial club, together with other members of the club, farmers and a number of women from various parts of La Salle County met with the committee and escorted it to the various halls, auditoriums and churches that were offered for the accommodation of the Twenty-second Annual Meeting of the Illinois Farmers' Institute. After selecting the First Methodist Church and the Christ Church for the general meetings and asking the local committee to hold the German Evangelical Church in reserve for sectional meetings, the committee voted to accept the invitation of Streator and La Salle County to hold the Twenty-second Annual Meeting in Streator on Wednesday, Thursday and Friday, February 21, 22 and 23, 1917.

The Commercial Club entertained the committee and other guests at luncheon at the Elks Club, after which a short business session was held in which the secretary was instructed to go to Southern Illinois and assist Directors Marlin and Aiken with the reorganization of several counties in the twenty-fourth and twenty-fifth districts.

The principal program subjects suggested by the local representatives were: Crop production, live stock, dairying, and roads. Suggestions of persons to handle topics was deferred until the next meeting of the committee.

The committee adjourned to meet at the call of the president.

AUDITOR'S REPORT.

To the Board of Directors of the Illinois Farmers' Institute.

GENTLEMEN: As your auditor, I beg leave to report that bills referred to me were audited, approved, and warrants in payment of same recommended, as shown by the following exhibit:

Voucher No.	To whom.	For what.	Fund No.	Amount.
1	L. M. James.....	Stenographer for July.....	2	\$ 51 00
2	John S. Fleming.....	Messenger for July.....	2	75 00
3	Clifford A. Livingston.....	Stenographer for July.....	2	32 33
4	Mrs. H. A. McKeene.....	Field worker.....	2	83 33
(Approved July 24, 1915.)				
5	Burroughs Adding Machine Co.....	Adding machine.....	1	300 06
6	Mrs. H. A. McKeene.....	Field worker.....	2	83 33
7	L. M. James.....	Services as stenographer.....	2	51 00
8	C. A. Livingston.....	Services as stenographer.....	2	32 33
9	John S. Fleming.....	Messenger and janitor.....	2	75 00
(Approved August 21, 1915.)				
10	Adams Express Co.....	Express charges.....	1	3 70
11	American Express Co.....	Express charges.....	1	9 66
12	Central Union Telephone Co.....	Telephone service.....	1	6 10
13	Maunder Ice Co.....	Ice supply.....	1	1 30
14	A. C. McClurg & Co.....	Library books.....	1	15 23
15	Merchants Transfer & Storage Co.....	Drayage.....	1	83
16	American Multigraph Sales Co.....	Multigraph repairs.....	1	55
17	Whitehead & Hoag Co.....	Two halftone cuts.....	1	2 58
18	L. M. James.....	Salary as stenographer.....	2	51 00
19	Clifford Livingston.....	Salary as stenographer.....	2	32 33
20	Mrs. H. A. McKeene.....	Salary as field worker.....	2	83 33
21	John S. Fleming.....	Salary as janitor and messenger.....	2	75 00
22	H. A. Winter.....	Services as speaker.....	3	20 00
23	P. R. Barnes.....	Services and expenses.....	3	13 25
24	Mrs. H. A. McKeene.....	Expenses as field worker.....	4	9 30
25	D. P. McCracken.....	Services as speaker.....	3	5 00
26	Geo. F. Tullock.....	Expenses as director.....	4	21 00
(Approved September 23, 1915.)				
27	Adams Express Co.....	Express.....	1	2 41
28	American Express Co.....	Express.....	1	7 67
29	Wells Fargo & Co., express.....	Express.....	1	6 40
30	Central Union Telephone Co.....	Exchange and tolls.....	1	7 90
31	Western Union Telegraph Co.....	Telegraph service.....	1	2 71
32	Gravel Springs Co.....	Water supply.....	1	1 35
33	Maurer Ice & Coal Co.....	Ice supply.....	1	1 25
34	McCoy Laundry Co.....	Towel supply.....	1	1 95
35	The John Bressmer Co.....	One vacuum cleaner.....	1	9 00
36	Bell Miller.....	Floral wreath.....	1	12 00
37	A. C. McClurg & Co.....	Library books.....	1	1 34
38	Tablet & Ticket Co.....	Gummed letters.....	1	9 98
39	Multiplex Display Fixture Co.....	Chart holder.....	1	10 00
40	Capitol Engraving Co.....	Halftone cuts.....	1	2 00
41	L. M. James.....	Salary as stenographer.....	2	51 00
42	Clifford A. Livingston.....	Salary as stenographer.....	2	32 33
43	John S. Fleming.....	Salary as messenger.....	2	75 00
44	Mrs. H. A. McKeene.....	Salary as field worker.....	2	83 33
45	Euclid B. Rogers.....	Services as speaker.....	3	60 00
46	Ralph Allen.....	Services as speaker.....	3	10 00
47	L. D. Seass.....	Services as speaker.....	3	25 00
48	Fred L. Hatch.....	Services as speaker.....	3	40 00
49	C. W. Caseley.....	Services as speaker.....	3	10 00
50	E. C. Martindale.....	Services as speaker.....	3	42 00
51	Walter H. Rowe.....	Services as speaker.....	3	56 00
52	Maud C. Hessler.....	Services as speaker.....	3	70 00
53	Mrs. L. S. Mann.....	Services as speaker.....	3	70 00
54	Anna Rogers Parr.....	Services as speaker.....	3	60 00
55	Mrs. J. Y. Shamel.....	Services as speaker.....	3	40 56
56	Mrs. J. M. Daniels.....	Services as speaker.....	3	70 00
57	Edw. F. Hartmann Co.....	Two thousand cards.....	4	7 00
58	Arthur Huntington.....	Painting one chart.....	4	5 00
59	H. A. McKeene.....	Expenses as secretary.....	4	32 41
60	A. N. Abbott.....	Expenses as director.....	4	17 19

Voucher			Fund	
No.	To whom.	For what.	No.	Amount.
61	Joseph Oldfield.....	Expenses as director.....	4	\$ 8 48
62	Ralph Allen.....	Expenses as director.....	4	95 93
63	C. V. Gregory.....	Expenses as director.....	4	11 05
64	F. J. Nirlder, treasurer.....	Marion County Farmers' Institute.....	5	75 00
65	E. F. Verry, treasurer.....	Tazewell County Farmers' Institute.....	5	75 00
66	W. K. Galeener, treasurer.....	Wayne County Farmers' Institute.....	5	61 40
(Approved November 2, 1915.)				
67	Adams Express Co.....	Express.....	1	3 38
68	American Express Co.....	Express.....	1	16 57
69	Wells Fargo & Co., express.....	Express.....	1	7 27
70	Western Union Telegraph Co.....	Telegraph service.....	1	19 37
71	Central Union Telephone Co.....	Exchange and tolls.....	1	11 95
72	Maurer Ice & Coal Co.....	Ice supply.....	1	1 39
73	J. H. Robey.....	Services as speaker.....	3	25 00
74	R. E. Muckelroy.....	Services as speaker.....	3	100 00
75	Wm. H. Mason.....	Services as speaker.....	3	18 00
76	Ralph Allen.....	Services as speaker.....	3	35 61
77	L. D. Seass.....	Services as speaker.....	3	40 00
78	Clayton C. Pervier.....	Services as speaker.....	3	20 00
79	F. I. Mann.....	Services as speaker.....	3	245 00
80	Euclid B. Rogers.....	Services as speaker.....	3	80 00
81	H. A. Winter.....	Services as speaker.....	2	75 00
82	H. M. Alken.....	Services as speaker.....	3	40 00
83	D. P. McCracken.....	Services as speaker.....	3	10 00
84	Maud C. Hessler.....	Services as speaker.....	3	50 00
85	Mrs. Lena S. Mann.....	Services as speaker.....	3	80 00
86	Mrs. E. A. Harrison.....	Services as speaker.....	3	50 00
87	Kathryn McMurray.....	Services as speaker.....	3	90 00
88	Mrs. Rufus Beard.....	Services as speaker.....	3	30 00
89	Mrs. J. M. Clark.....	Services as speaker.....	3	12 00
90	Anna Rogers Parr.....	Services as speaker.....	3	10 00
91	Mrs. J. M. Daniels.....	Services as speaker.....	3	20 00
92	Margaret M. Bangs.....	Services as speaker.....	3	105 00
93	A. N. Abbott.....	Expenses as director.....	4	15 88
94	H. E. Young.....	Expenses as director.....	4	32 70
95	August Geweke.....	Expenses as director.....	4	13 20
96	F. I. Mann.....	Expenses as director.....	4	18 10
97	D. M. Marlin.....	Expenses as director.....	4	110 91
98	John T. Zieren, treasurer.....	Clinton County Farmers' Institute.....	5	73 93
99	G. C. Duensing, treasurer.....	Cumberland County Farmers' Institute.....	5	35 90
100	C. F. Easterday, treasurer.....	Fayette County Farmers' Institute.....	5	75 00
101	R. R. Ward, treasurer.....	Franklin County Farmers' Institute.....	5	75 00
102	Edw. Schneider, treasurer.....	Hardin County Farmers' Institute.....	5	75 00
103	Anton Lahr, treasurer.....	Lawrence County Farmers' Institute.....	5	75 00
104	Morris Rader, treasurer.....	Peoria County Farmers' Institute.....	5	75 00
105	Frank Keith, treasurer.....	Perry County Farmers' Institute.....	5	75 00
106	C. M. Doyle, treasurer.....	Schuyler County Farmers' Institute.....	5	75 00
107	C. S. Andrus, treasurer.....	Wabash County Farmers' Institute.....	5	75 00
108	Geo. C. Campbell, treasurer.....	Williamson County Farmers' Institute.....	5	75 00
(Approved November 15, 1915.)				
109	L. M. James.....	Services as stenographer.....	2	51 00
110	C. A. Livingston.....	Services as stenographer.....	2	32 33
111	John S. Fleming.....	Services as messenger.....	2	75 00
112	Mrs. H. A. McKeene.....	Field worker.....	2	83 33
113	Coe Brothers.....	One box manila envelopes.....	1	2 50
114	Kalamazoo Multicopy Co.....	Typewriter supplies.....	1	5 00
115	Sherman Luttrell.....	Freight.....	1	91
116	A. N. Abbott.....	Services as speaker.....	3	45 00
117	H. A. Winter.....	Services as speaker.....	3	40 00
118	August Geweke.....	Services as speaker.....	3	10 00
119	J. P. Gilbert.....	Services as speaker.....	3	30 00
120	R. B. Doan.....	Services as speaker.....	3	10 00
121	Clayton C. Pervier.....	Services as speaker.....	3	20 00
122	J. P. Mason.....	Services as speaker.....	3	140 00
123	Mrs. J. H. McMurray.....	Services as speaker.....	3	100 00
124	Mrs. H. M. Dunlap.....	Services as speaker.....	3	10 00
125	Maud C. Hessler.....	Services as speaker.....	3	30 00
126	P. R. Barnes.....	Extension work expense.....	3	23 15
127	John L. Becker.....	Extension work expense.....	3	5 00
128	Edward Grimes.....	Expense as director.....	4	19 00
129	H. M. Alken.....	Expense as director.....	4	20 10
130	G. G. Hopping.....	Expense as director.....	4	28 10
131	H. E. Young.....	Expense as director.....	4	14 60
132	H. A. McKeene.....	Expense as secretary.....	4	10 93
133	Mrs. H. A. McKeene.....	Expense as field worker.....	4	5 39
134	J. P. Mason.....	Expense as director.....	4	18 74
135	Loyd F. Cox, treasurer.....	Alexander County Institute.....	5	75 00
136	Geo. McElyea, treasurer.....	Clay County Institute.....	5	74 53
137	W. J. Zeligler, treasurer.....	Dewitt County Institute.....	5	54 55
138	Johnson Kanady, treasurer.....	Gallatin County Institute.....	5	75 00
139	John Norris, treasurer.....	Hamilton County Institute.....	5	75 00
140	J. L. Miller, treasurer.....	Jackson County Institute.....	5	75 00
141	T. J. Holstlaw, treasurer.....	Jefferson County Institute.....	5	75 00

Voucher No.	To whom.	For what.	Fund No.	Amount.
142	Chas. Warner, treasurer	Mason County Institute	5	\$ 75 00
143	The First National Bank	Pope County Institute	5	75 00
144	H. A. McKeene, treasurer	Scott County Institute	5	75 00
145	Fred H. Munson, treasurer	Shelby County Institute	5	47 88
(Approved November 30, 1915.)				
146	Adams Express Co.	Express	1	1 70
147	American Express Co.	Express	1	18 33
148	Wells Fargo & Co., express	Express	1	8 20
149	Western Union Telegraph Co.	Telegraph service	1	1 23
150	Central Union Telephone Co.	Exchange and tolls	1	20 35
151	Maurer Ice & Coal Co.	Ice supply	1	1 30
152	Coe Brothers	Office supplies	1	5 75
153	L. M. James	Salary as stenographer	2	51 00
154	Clifford A. Livingston	Salary as stenographer	2	32 33
155	John S. Fleming	Salary as messenger	2	75 00
156	Mrs. H. A. McKeene	Salary as field worker	2	93 33
157	Walter H. Rowe	Services as speaker	3	8 00
158	F. I. Mann	Services as speaker	3	30 78
159	Clayton C. Pervier	Services as speaker	3	30 00
160	D. P. McCracken	Services as speaker	3	30 00
161	J. R. Newbery	Services as speaker	3	30 00
162	H. A. Winter	Services as speaker	3	35 90
163	H. C. McCarrel	Services as speaker	3	140 00
164	Mrs. E. F. Ford	Services as speaker	3	20 00
165	Lena S. Mann	Services as speaker	3	31 02
166	Mrs. Grace Viall Gray	Services as speaker	3	10 00
167	Mrs. J. M. Daniels	Services as speaker	3	40 00
168	Mrs. Anna Rogers Parr	Services as speaker	3	30 00
169	Mrs. Maud C. Hessler	Services as speaker	3	44 72
170	Mrs. J. Y. Shamel	Services as speaker	3	40 00
171	A. N. Abbott	Expenses as director	4	9 92
172	H. M. Aiken	Expenses as director	4	21 60
173	Ralph Allen	Expenses as director	4	17 17
174	R. B. Swift	Expenses as director	4	2 19
175	Clayton C. Pickett	Expenses as director	4	14 25
176	J. B. Burrows	Expenses as director	4	27 52
177	Joseph Oldfield	Expenses as director	4	35 32
178	Frank S. Haynes	Expenses as director	4	28 96
179	H. A. McKeene	Expenses as secretary	4	17 30
180	Chas. H. Lamar, treasurer	Calhoun County Farmers' Institute	5	75 00
181	Orion B. Goble, treasurer	Coles County Farmers' Institute	5	73 60
182	O. L. Wakefield, treasurer	Crawford County Farmers' Institute	5	75 00
183	John A. Craver, treasurer	Effingham County Farmers' Institute	5	75 00
184	L. O. Burgett, treasurer	Henderson County Farmers' Institute	5	75 00
185	J. R. Newberry, treasurer	Jasper County Farmers' Institute	5	75 00
186	S. H. Johnson, treasurer	Massac County Farmers' Institute	5	34 24
187	Edward Grimes, treasurer	Montgomery County Farmers' Institute	5	75 00
188	Mrs. R. W. Fletcher, treasurer	Pike County Farmers' Institute	5	75 00
189	N. R. Lessley, treasurer	Randolph County Farmers' Institute	5	75 00
190	George S. Hofl, treasurer	Vermilion County Farmers' Institute	5	75 00
191	A. C. Clippinger, treasurer	White County Farmers' Institute	5	72 10
192	Ralph Allen	Services as speaker	3	35 00
(Approved December 18, 1915.)				
193	American Express Co.	Express charges	1	1 20
194	Western Union Telegraph Co.	Telegraph service	1	4 90
195	Gravel Springs Co.	Water supply	1	1 35
196	Central Union Telegraph Co.	Exchange and tolls	1	9 90
197	Maurer Ice & Coal Co.	Ice supply	1	1 30
198	McCoy Laundry Co.	Towel supply	1	1 95
199	American Multigraph Sales Co.	Multigraph supplies	1	95
200	Albert E. Jack	Services as speaker	3	50 00
201	L. S. Griffith	Services as speaker	3	40 00
202	Mrs. Lena S. Mann	Services as speaker	3	70 00
203	Walter H. Rowe	Services as speaker	3	24 00
204	W. E. Riegel	Services as speaker	3	22 42
205	L. D. Seass	Services as speaker	3	177 50
206	W. E. Holben	Services as speaker	3	60 00
207	Mrs. J. H. McMurray	Services as speaker	3	80 00
208	Euclid B. Rogers	Services as speaker	3	30 00
209	W. D. Snow	Services as speaker	3	15 50
210	Loyd F. Cox	Fee advanced speaker	3	20 00
211	Mrs. J. M. Daniels	Services as speaker	3	10 00
212	J. V. Stevenson	Services as speaker	3	10 00
213	Clayton C. Pervier	Services as speaker	3	50 00
214	Geo. F. Tullock	Services as speaker	3	10 00
215	Anna Rogers Parr	Services as speaker	3	20 00
216	Mrs. E. A. Harrison	Services as speaker	3	30 00
217	A. N. Abbott	Services as speaker	3	21 00
218	Frank M. Harry	Services as speaker	3	5 00
219	C. W. Caseley	Services as speaker	3	10 00
220	Geo. F. Tullock	Expenses as director	4	15 30
221	W. E. Nelson, treasurer	Brown County Farmers' Institute	5	75 00
222	W. B. O'Neal, treasurer	Champaign County Farmers' Institute	5	75 00

Voucher No.	To whom.	For what.	Fund No.	Amount.
223	Thomas W. Smith, treasurer.	Edwards County Farmers' Institute.	5	\$ 27 75
224	O. B. Rives, treasurer.	Greene County Farmers' Institute.	5	51 81
225	H. U. Landon, treasurer.	Jersey County Farmers' Institute.	5	75 00
226	John Zeter, treasurer.	Logan County Farmers' Institute.	5	75 00
227	J. F. Held, treasurer.	Marshall County Farmers' Institute.	5	75 00
228	Ray Barrick, treasurer.	Ogle County Farmers' Institute.	5	75 00
229	Edward Holly, treasurer.	Putnam County Farmers' Institute.	5	75 00
230	P. R. Barnes.	Field worker (Supt. Cook Co. Institutes).	2	28 50
231	John L. Hawker, treasurer.	Clark County Farmers' Institute.	5	75 00
(Approved January 11, 1916.)				
232	Adams Express Co.	Express.	1	2 93
233	Illinois State Journal Co.	Newspaper subscription.	1	6 76
234	L. M. James.	Salary as stenographer.	2	51 00
235	C. A. Livingston.	Salary as stenographer.	2	32 33
236	John S. Fleming.	Salary as messenger.	2	75 00
237	Mrs. H. A. McKeene.	Salary as field worker.	2	83 33
238	W. D. Snow.	Services as speaker.	3	15 00
239	L. S. Griffith.	Services as speaker.	3	48 00
240	Euclid B. Rogers.	Services as speaker.	3	60 00
241	J. R. Newberry.	Services as speaker.	3	30 00
242	A. N. Abbott.	Services as speaker.	3	20 64
243	Wm. Webb.	Services as speaker.	3	50 00
244	Harold C. Kessinger.	Services as speaker.	3	30 00
245	Clayton C. Pervier.	Services as speaker.	3	20 00
246	Fred L. Hatch.	Services as speaker.	3	20 00
247	Chas. Foss.	Services as speaker.	3	10 00
248	J. P. Mason.	Services as speaker.	3	70 00
249	Maud C. Hessler.	Services as speaker.	3	110 00
250	Grace Viall Gray.	Services as speaker.	3	50 00
251	Margaret M. Bangs.	Services as speaker.	3	65 00
252	Charlotte Viall.	Services as speaker.	3	25 00
253	J. P. Mason.	Expenses as director.	4	6 80
254	H. A. McKeene.	Salary as secretary.	Special	166 66
255	J. E. Thompson, treasurer.	Rock Island County Farmers' Institute.	5	64 50
256	H. H. Duncan, treasurer.	Mercer County Farmers' Institute.	5	75 00
257	E. R. Hembrough, treasurer.	Morgan County Farmers' Institute.	5	75 00
258	F. D. Gehant, treasurer.	Lee County Farmers' Institute.	5	59 00
(Approved January 25, 1916.)				
259	Adams Express Co.	Express charges.	1	11 15
260	American Express Co.	Express charges.	1	10 49
261	Wells Fargo & Co., express.	Express charges.	1	2 36
262	Western Union Telegraph Co.	Telegraph service.	1	8 44
263	Central Union Telephone Co.	Exchange and tolls.	1	7 30
264	Maurer Ice & Coal Co.	Ice supply.	1	1 30
265	Capitol Engraving Co.	Copper halftone cuts.	4	77 25
266	The Edw. F. Hartmann Co.	4,000 programs.	4	80 00
267	Edward B. Landis.	Services as speaker.	3	60 00
268	Ralph Allen.	Services as speaker.	3	50 00
269	W. B. Mills.	Services as speaker.	3	60 00
270	J. H. Martin.	Services as speaker.	3	165 00
271	Clayton C. Pervier.	Services as speaker.	3	50 00
272	Walter H. Rowe.	Services as speaker.	3	40 00
273	Euclid B. Rogers.	Services as speaker.	3	20 00
274	A. W. Brayton.	Services as speaker.	3	10 00
275	H. A. Winter.	Services as speaker.	3	75 00
276	Maud C. Hessler.	Services as speaker.	3	30 00
277	Mrs. Minnie G. Stearns.	Services as speaker.	3	20 00
278	Mrs. J. Y. Shamel.	Services as speaker.	3	50 00
279	J. G. Imboden.	Services as speaker.	3	60 00
280	Grace Viall Gray.	Services as speaker.	3	50 00
281	Mrs. J. M. Daniels.	Services as speaker.	3	50 00
282	Mrs. E. A. Harrison.	Services as speaker.	3	30 00
283	Mrs. Fred L. Hatch.	Services as speaker.	3	30 00
284	Mrs. J. H. McMurray.	Services as speaker.	3	170 00
285	Charlotte Viall.	Services as speaker.	3	15 00
286	H. A. McKeene.	Expenses as secretary.	4	8 40
287	Mrs. H. A. McKeene.	Expenses as field worker.	4	5 58
288	Ralph Allen.	Expenses as director.	4	13 10
289	J. M. Daniels, treasurer.	Bond County Farmers' Institute.	5	75 00
290	J. H. Miles, treasurer.	Carroll County Farmers' Institute.	5	75 00
291	Claude Roberts, treasurer.	Douglas County Farmers' Institute.	5	75 00
292	A. F. Weber, treasurer.	Fulton County Farmers' Institute.	5	75 00
293	S. D. Farris, treasurer.	Hancock County Farmers' Institute.	5	75 00
294	Frank Pick, treasurer.	Kane County Farmers' Institute.	5	75 00
295	W. G. Jones, treasurer.	McDonough County Farmers' Institute.	5	75 00
296	E. H. Brucker, treasurer.	Monroe County Farmers' Institute.	5	75 00
297	Geo. A. Felids, treasurer.	Moultrie County Farmers' Institute.	5	75 00
298	D. M. Moore, treasurer.	Platt County Farmers' Institute.	5	75 00
299	Thos. Fish, Jr., treasurer.	Sangamon County Farmers' Institute.	5	75 00
300	Ben Koesterer, treasurer.	St. Clair County Farmers' Institute.	5	75 00
301	Stephen Rigney, treasurer.	Stephenson County Farmers' Institute.	5	51 98
302	K. G. Phelps, treasurer.	Warren County Farmers' Institute.	5	75 00
303	Louis F. Ochs, treasurer.	Washington County Farmers' Institute.	5	75 00

Voucher No.	To whom.	For what.	Fund No.	Amount.
304	B. F. Hoover, treasurer	Whiteside County Farmers' Institute	5	\$ 75 00
305	Geo. P. Gregory, treasurer (Approved February 12, 1916.)	Iroquois County Farmers' Institute	5	75 00
306	Mrs. H. A. McKeene	Salary as field worker	2	83 33
307	John S. Fleming	Salary as messenger	2	75 00
308	L. M. James	Salary as stenographer	2	51 00
309	C. A. Livingston	Salary as stenographer	2	32 33
310	P. R. Barnes	Salary as field worker	2	57 75
311	J. H. Martin	Services as speaker	3	40 00
312	D. P. McCracken	Services as speaker	3	5 00
313	E. B. Landis	Services as speaker	3	10 00
314	William Osburn	Services as speaker	3	10 00
315	Maud C. Hessler	Services as speaker	3	20 00
316	Anna Rogers Parr	Services as speaker	3	60 00
317	Mrs. Grace Viall Gray	Services as speaker	3	60 00
318	H. A. McKeene	Salary as secretary	Special	166 66
319	J. H. Rawson, treasurer	Bureau County Farmers' Institute	5	75 00
320	W. I. Ziegler, treasurer	Dewitt County Farmers' Institute	5	14 60
321	H. P. Southcomb, treasurer	Grundy County Farmers' Institute	5	75 00
322	B. Sherman, treasurer	Henry County Farmers' Institute	5	75 00
323	J. C. B. Heaton, president	Johnson County Farmers' Institute	5	75 00
324	Geo. Courville, treasurer	Kankakee County Farmers' Institute	5	51 23
325	C. E. Babbett, treasurer	Macoupin County Farmers' Institute	5	75 00
326	Frank Britton, treasurer	Richland County Farmers' Institute	5	75 00
327	N. F. Elder, treasurer	Saline County Farmers' Institute	5	75 00
328	H. A. McKeene	Postage	1	100 00
329	Margaret Coffey (Approved February 24, 1916.)	Services as speaker	3	25 00
330	Mrs. Christine Frederick	S. & E. State Institute	4	181 00
331	Mrs. R. W. Fletcher	Expense State Institute	4	11 66
332	R. A. Moore	S. & E. State Institute	4	46 20
333	B. W. Lovins	Expense State Institute	4	4 20
334	J. P. Gilbert	S. & E. State Institute	4	41 64
335	Rodney B. Rigor	Expense State Institute	4	15 88
336	Glen H. Gordon	Expense State Institute	4	3 15
337	C. V. Gregory	Expenses as director	4	21 17
338	James H. Greene	Expense State Institute	4	7 34
339	J. C. Mies	Expense State Institute	4	13 98
340	Paul D. Cooper	Expense State Institute	4	5 26
341	E. E. Hoskins	Expense State Institute	4	7 48
342	F. C. Grannis	Expense State Institute	4	19 24
343	Laura A. Gonterman	Expense State Institute	4	13 46
344	Mrs. M. M. Bangs	Expense State Institute	4	10 00
345	P. R. Barnes	Expenses as director	4	13 92
346	Geo. C. Gale	Expense State Institute	4	13 72
347	Mrs. Anna F. Johnson	Services as speaker	4	10 00
348	Miss Fern Dobbs	Expense State Institute	4	4 15
349	L. M. James	Expense State Institute	4	6 15
350	Miss E. M. Benefiel	Expense State Institute	4	28 00
351	Kathryn McMurray	Expense State Institute	4	12 12
352	Maud C. Hessler	Expense State Institute	4	10 80
353	Y. W. C. A. (Decatur)	Luncheon for speakers	4	11 00
354	Margaret E. Brooks	S. & E. State Institute	4	12 60
355	Cyril G. Hopkins	Expense State Institute	4	5 95
356	Emmeline S. Beatty	Expense State Institute	4	18 82
357	A. V. Schermerhorn	Expense State Institute	4	11 00
358	H. E. Young	Expenses as director	4	16 92
359	Mrs. Grace Viall Gray	S. & E. State Institute	4	32 60
360	C. H. Oathout	Expense State Institute	4	3 00
361	Brother Leo	S. & E. State Institute	4	25 00
362	Mrs. F. H. Morris	Expense State Institute	4	2 50
363	J. C. Sailor	Expense State Institute	4	9 75
364	Mrs. J. Y. Shamel	Expense State Institute	4	9 50
365	E. Davenport	Expense State Institute	4	9 99
366	Chas. Adkins	S. & E. State Institute	4	123 65
367	Mrs. Fred L. Hatch	Expense State Institute	4	29 39
368	Wm. H. Ashdown	Expenses as director	4	12 00
369	D. M. Marlin	Expenses as director	4	77 08
370	Beulah B. Marlin	Expenses State Institute	4	24 65
371	Lena S. Mann	Expenses State Institute	4	10 55
372	F. I. Mann	Expenses as director	4	29 86
373	Mrs. H. A. McKeene	Expense, secretary of household science	4	12 85
374	H. A. McKeene	Expense as secretary	4	15 20
375	Aug. Geweke	Expenses as director	4	146 78
376	J. B. Burrows	Expenses as director	4	36 88
377	John W. Sanner	Expenses State Institute	4	8 07
378	Mrs. J. E. Kirkpatrick	Expenses State Institute	4	13 95
379	Warren Moffet	Expenses State Institute	4	5 98
380	Kathryn McMurray	Services as speaker	3	40 00
381	Mrs. Fred L. Hatch	Services as speaker	3	60 00
382	G. E. Hulting	Services as judge	3	10 00
383	Clayton C. Pervier	Services as speaker	3	80 00
384	H. C. McCarrel	Services as speaker	3	60 00

Voucher No.	To whom.	For what.	Fund No.	Amount.
385	F. I. Mann.	Services as speaker	3	\$190 00
386	Mrs. Lena S. Mann.	Services as speaker	3	140 00
387	B. F. Kincald, treasurer.	Christian County Farmers' Institute.	5	75 00
388	Aug. Geweke, treasurer.	Cook County Farmers' Institute.	5	75 00
389	J. J. Case, treasurer.	Dupage County Farmers' Institute.	5	75 00
390	J. Kennedy Kincald, treasurer.	Menard County Farmers' Institute.	5	45 05
391	E. L. Mendenhall, treasurer.	Stark County Farmers' Institute.	5	75 00
392	Russell H. Coffin, treasurer.	Winnebago County Farmers' Institute.	5	75 00
(Approved March 6, 1916.)				
392 1/2	A. N. Abbott.	Expenses as director	4	31 74
393	Joseph Oldfield.	Expenses as director	4	15 76
394	G. G. Hopping.	Expenses as director	4	35 50
395	Wm. H. Ashdown.	Expenses as director	4	19 03
396	Clayton C. Pickett.	Expenses as director	4	28 36
397	Frank S. Haynes.	Expenses as director	4	43 38
398	H. E. Young.	Expenses as director	4	14 30
399	Ralph Allen.	Expenses as director	4	14 83
400	E. W. Burroughs.	Expenses as director	4	64 20
401	E. Davenport.	Expenses as director	4	10 69
402	Maud C. Hessler.	Expense as officer.	4	1 80
403	John Bressmer Co.	Ribbon for badges.	4	4 20
404	Herbert W. Mumford.	Expenses State Institute.	4	5 95
405	Mrs. E. W. Burroughs.	Services and expense.	4	27 30
406	Gertrude E. Moore.	Expenses State Institute.	4	19 42
407	Mrs. Maria R. Hoener.	Expenses State Institute.	4	17 25
408	Mrs. H. G. Easterly.	Expenses State Institute.	4	12 65
409	Edna Skinner.	Services and expense State Institute.	4	11 70
410	Isabel Bevier.	Expenses State Institute.	4	3 90
411	Mrs. H. M. Dunlap.	Expenses State Institute.	4	12 36
412	Mrs. Margaret M. Bangs.	Services as speaker	3	30 00
413	Adams Express Co.	Express charges.	1	10 00
414	American Express Co.	Express charges.	1	12 24
415	Wells Fargo & Co., express.	Express charges.	1	8 23
416	Western Union Telegraph Co.	Telegraph service.	1	1 40
417	Central Union Telephone Co.	Exchange and tolls.	1	14 90
418	Gravel Springs Co.	Water supply.	1	1 45
419	Maurer Ice & Coal Co.	Ice supply.	1	1 25
420	Coe Brothers.	Office supplies.	1	18 25
421	H. H. Parke, treasurer.	Dekalb County Farmers' Institute.	5	75 00
422	J. P. Carson, treasurer.	Jo Daviess County Farmers' Institute.	5	75 00
423	W. N. Strawn, treasurer.	La Salle County Farmers' Institute.	5	75 00
424	Edward Grimes.	Expenses as director.	4	22 94
(Approved March 10, 1916.)				
425	Stuart Kenelpp.	Field worker.	1	15 00
426	H. A. McKeene.	Salary as secretary.	Special	166 66
427	Mrs. H. A. McKeene.	Salary as secretary of household science.	2	83 33
428	L. M. James.	Salary as stenographer.	2	51 00
429	John S. Fleming.	Salary as messenger.	2	75 00
430	C. A. Livingstone.	Salary as stenographer.	2	32 33
431	Mrs. H. A. McKeene.	Expense First Conference Trip.	4	11 47
432	H. A. McKeene.	Expense as secretary.	4	15 72
433	Chas. Gray.	Expenses as director.	4	10 25
434	Aug. Geweke.	Expenses as director.	4	29 30
435	Geo. F. Tullock.	Expenses as director.	4	63 06
436	S. B. Mason.	Expenses as director.	4	71 94
437	A. N. Abbott.	Expenses as director.	4	20 37
438	H. M. Aiken.	Expenses as director.	4	17 00
439	P. R. Barnes.	Expenses as director.	4	13 60
440	Mrs. Wm. Downey.	Expense better babies contest.	4	13 38
441	West Paper Co.	100 23x26 paper bags.	4	70
442	Linn & Scruggs Dry Goods.	Expense better babies contest.	4	1 98
443	Williams Printing Co.	Printing for better babies contest.	4	5 00
444	Decatur Drug Co.	Expense better babies contest.	4	4 40
445	First Presbyterian Church.	Expense State Meeting.	4	5 00
446	Harriet Day Chandler.	Expense better babies contest.	4	1 35
447	Wm. Gushard Dry Goods Co.	Expense better babies contest.	4	8 08
448	Wallender & Wilder.	Expense better babies contest.	4	2 45
449	Edw. F. Hartmann Co.	Printing for State Institute.	4	77 20
450	F. A. Martin.	Fourteenth District Conference.	4	1 20
451	J. D. Regan.	Fourteenth District Conference.	4	1 20
452	Mrs. J. C. Stewart.	Fourteenth District Conference.	4	1 10
453	C. M. Burford.	Fourteenth District Conference.	4	1 40
454	Mrs. Ralph Butler.	Fourteenth District Conference.	4	1 00
455	H. H. Duncan.	Fourteenth District Conference.	4	2 00
456	Mrs. T. A. Vernon.	Fourteenth District Conference.	4	2 00
457	Lou M. Harris.	Fourteenth District Conference.	4	2 70
458	Mrs. W. S. Sloan.	Fourteenth District Conference.	4	2 00
459	B. E. Decker.	Fourteenth District Conference.	4	2 60
460	J. G. Gibson.	Fourteenth District Conference.	4	1 43
461	A. L. Beall.	Fourteenth District Conference.	4	3 19
462	S. D. Faris.	Fourteenth District Conference.	4	6 95
463	Mrs. S. D. Faris.	Fourteenth District Conference.	4	6 95
464	Mrs. W. G. Jones.	Fourteenth District Conference.	4	2 60

Voucher No.	To whom.	For what.	Fund No.	Amount.
465	Ernest D. Walker	Fourteenth District Conference	4	\$ 3 50
466	W. O. Kunkel	Fourteenth District Conference	4	6 73
467	G. A. Switzer	Fourteenth District Conference	4	2 45
468	Mrs. J. E. Kirkpatrick	Fifteenth District Conference	4	6 00
469	Thomas S. Carlin	Fifteenth District Conference	4	3 92
470	J. E. Meatheringham	Fifteenth District Conference	4	3 62
471	Arthur Brown	Fifteenth District Conference	4	3 71
472	D. T. Rauch	Fifteenth District Conference	4	4 57
473	Mrs. J. E. Stephens	Fifteenth District Conference	4	3 75
474	Chas. R. Settles	Fifteenth District Conference	4	3 80
475	Mrs. J. W. Whitson	Fifteenth District Conference	4	3 41
476	Calvin L. Cain	Fifteenth District Conference	4	3 61
477	Mary Stafford	Fifteenth District Conference	4	1 00
478	John H. Steiner	Fifteenth District Conference	4	5 00
479	Mrs. Maude Stevenson	Fifteenth District Conference	4	1 90
480	A. L. Odenweller	Fifteenth District Conference	4	3 94
481	Edgar C. Love	Fifteenth District Conference	4	1 90
482	Arthur F. Chase	Fifteenth District Conference	4	1 90
483	M. M. Cook	Fifteenth District Conference	4	2 62
484	Ben. L. Smith	Sixteenth District Conference	4	75
485	R. B. Doan	Sixteenth District Conference	4	1 92
486	C. J. Mann	Sixteenth District Conference	4	5 53
487	W. W. Dunbar	Sixteenth District Conference	4	8 88
488	J. M. Rapp	Sixteenth District Conference	4	9 13
489	Mrs. Lora F. Stewart	Sixteenth District Conference	4	5 58
490	Hervey S. Studyvin	Sixteenth District Conference	4	4 06
491	Mrs. Walter A. Paxson	Sixteenth District Conference	4	4 81
492	L. E. Morine	Sixteenth District Conference	4	4 26
493	Walter A. Paxson	Sixteenth District Conference	4	8 81
494	F. M. Patterson	Sixteenth District Conference	4	1 92
495	Fred E. Winans	Sixteenth District Conference	4	4 18
496	G. C. Baker	Sixteenth District Conference	4	3 13
497	L. A. McKean	Sixteenth District Conference	4	3 23
498	Mrs. Grace T. Winans	Sixteenth District Conference	4	4 18
499	Mrs. Maud Kirkman	Sixteenth District Conference	4	68
500	Mrs. Blanche McDonald	Sixteenth District Conference	4	68
501	W. F. DuMars	Sixteenth District Conference	4	2 28
502	Konrad Koch	Sixteenth District Conference	4	2 23
503	A. B. Wright	Sixteenth District Conference	4	2 23
504	Edgar Nichols	Sixteenth District Conference	4	3 63
505	Geo. Courville	Kankakee County Farmers' Institute	5	23 77
506	Geo. D. Ament	Kendall County Farmers' Institute	5	75 00
(Approved March 27, 1916)				
507	Adams Express Co.	Express	1	19 92
508	American Express Co.	Express	1	42 57
509	Wells Fargo & Co., express	Express	1	22 27
510	Western Union Telegraph Co.	Telegraph service	1	6 20
511	Central Union Telephone Co.	Exchange and tolls	1	7 75
512	H. A. McKeene	Postage	1	100 00
513	Capitol Engraving Co.	Single column cut	1	1 00
514	McCoy Laundry Co.	Towel supply	1	1 95
515	Maurer Ice & Coal Co.	Ice supply	1	1 35
516	W. L. Corris	Reporting and transcript	1	214 90
517	Josephine Corbus	Services as speaker	3	10 00
518	E. B. Landis	Services as speaker	3	10 00
519	J. V. Stevenson	Services as speaker	3	10 00
520	J. Orton Finley	Services as speaker	3	10 00
521	Maud C. Hessler	Services as speaker	3	10 00
522	H. H. Parke	Expense State Institute	4	14 54
523	St. Nicholas Hotel	Expense Mrs. Frederick	4	5 65
524	Herald Printing & Stationery Co.	500 envelopes	4	2 00
525	Decatour Chamber of Commerce	Advanced for lunches	4	21 50
526	C. V. Gregory	Expenses as director	4	12 90
527	Wm. H. Ashdown	Expenses as director	4	16 87
528	J. P. Mason	Expenses as director	4	38 24
529	H. A. McKeene	Expense as secretary	4	36 36
530	Mrs. H. A. McKeene	Expenses as field worker	4	23 56
531	W. H. Groh	Fourteenth District Conference	4	3 61
532	John E. Barrett	Tenth District Conference	4	3 20
533	Geo. S. Brainerd	Tenth District Conference	4	2 00
534	Mrs. F. M. Harding	Tenth District Conference	4	2 00
535	Alta Humiston	Eleventh District Conference	4	2 00
536	Geo. H. Keller	Eleventh District Conference	4	2 20
537	E. A. Ellis	Eleventh District Conference	4	2 50
538	J. E. Readhimer	Eleventh District Conference	4	2 00
539	A. W. Davis	Eleventh District Conference	4	3 25
540	Mrs. E. D. Spencer	Eleventh District Conference	4	2 50
541	C. W. Colton	Eleventh District Conference	4	2 60
542	Mrs. E. A. Harrison	Eleventh District Conference	4	2 60
543	Mrs. A. R. Kercheval	Eleventh District Conference	4	1 75
544	Henry Klett	Eleventh District Conference	4	3 25
545	Wm. Hammerschmidt	Eleventh District Conference	4	2 00
546	R. T. Morgan	Eleventh District Conference	4	2 00

Voucher No.	To whom.	For what.	Fund No.	Amount.
547	E. B. Heaton.....	Eleventh District Conference.....	4	\$ 2 00
548	Russell H. Coffin.....	Twelfth District Conference.....	4	4 15
549	E. A. Denney.....	Twelfth District Conference.....	4	4 50
550	Gertrude E. Moore.....	Twelfth District Conference.....	4	4 15
551	Eva M. Collins.....	Twelfth District Conference.....	4	3 40
552	Geo. F. Tullock.....	Twelfth District Conference.....	4	8 75
553	W. W. Coultas.....	Twelfth District Conference.....	4	3 17
554	A. U. Dodge.....	Twelfth District Conference.....	4	3 31
555	B. W. Lyons.....	Twelfth District Conference.....	4	3 39
556	C. H. Root.....	Twelfth District Conference.....	4	4 00
557	Frank Ganzert.....	Twelfth District Conference.....	4	4 00
558	F. H. Demaree.....	Twelfth District Conference.....	4	4 00
559	Mrs. Belle Walsh.....	Twelfth District Conference.....	4	4 00
560	Mrs. S. E. Bradt.....	Twelfth District Conference.....	4	3 17
561	Jno. W. Thompson.....	Twelfth District Conference.....	4	3 62
562	Arthur R. Warren.....	Twelfth District Conference.....	4	3 62
563	Mrs. Alice A. Covey.....	Twelfth District Conference.....	4	3 42
564	Elizabeth B. Harvey.....	Twelfth District Conference.....	4	3 50
565	Mrs. W. W. Watts.....	Twelfth District Conference.....	4	3 75
566	Mrs. Thos. W. Esmond.....	Twelfth District Conference.....	4	3 75
567	J. V. Stevenson.....	Twelfth District Conference.....	4	4 42
568	J. S. Brooks.....	Twelfth District Conference.....	4	4 25
569	E. L. Matlock.....	Twelfth District Conference.....	4	2 75
570	Geo. Elliott.....	Twelfth District Conference.....	4	2 75
571	Geo. D. Amen.....	Twelfth District Conference.....	4	2 75
572	Anna Rogers Parr.....	Services in Menard County.....	5	10 00
573	C. W. Colton, treasurer.....	McHenry County Institute.....	5	75 00
574	W. C. Slemons, treasurer.....	Edgar County Institute.....	5	75 00
(Approved April 18, 1916.)				
575	Maurer Ice & Coal Co.....	Ice supply.....	1	1 25
576	H. A. McKeene.....	Salary as secretary.....	Special	166 66
577	L. M. James.....	Salary as stenographer.....	2	60 00
578	C. A. Livingston.....	Salary as stenographer.....	2	10 00
579	Mrs. H. A. McKeene.....	Salary as field worker.....	2	83 83
580	John S. Fleming.....	Salary as messenger.....	2	75 00
581	J. B. Burrows.....	Services as speaker.....	3	10 00
582	Mrs. Fred L. Hatch.....	Services as speaker.....	3	10 00
583	Frank S. Haynes.....	Expenses as director.....	4	20 71
584	J. P. Mason.....	Expenses as director.....	4	27 41
585	G. G. Hopping.....	Expenses as director.....	4	11 25
586	H. A. McKeene.....	Expenses as secretary.....	4	47 42
587	Mrs. H. A. McKeene.....	Expense as field worker.....	4	34 96
588	E. H. Dirksen.....	Thirteenth District Conference.....	4	1 00
589	Mrs. W. Agney.....	Thirteenth District Conference.....	4	1 25
590	A. H. Lytle.....	Thirteenth District Conference.....	4	2 34
591	E. W. Puterbaugh.....	Thirteenth District Conference.....	4	1 26
592	F. D. Linn.....	Thirteenth District Conference.....	4	1 65
593	H. B. Price.....	Thirteenth District Conference.....	4	2 98
594	W. S. Curtis.....	Thirteenth District Conference.....	4	3 00
595	Jesse Phillips.....	Thirteenth District Conference.....	4	4 48
596	J. Howard Swanrey.....	Thirteenth District Conference.....	4	65
597	Benj. L. Birkbeck.....	Thirteenth District Conference.....	4	2 04
598	H. M. Rowland.....	Thirteenth District Conference.....	4	2 76
599	Theo. F. Ellis.....	Thirteenth District Conference.....	4	1 25
600	Mrs. C. C. Ackert.....	Thirteenth District Conference.....	4	1 94
601	Nellie Cahill.....	Thirteenth District Conference.....	4	3 12
602	C. L. Passmore.....	Thirteenth District Conference.....	4	3 50
603	Abram Ackert.....	Thirteenth District Conference.....	4	1 94
604	Mrs. J. L. Peugh.....	Thirteenth District Conference.....	4	3 50
605	J. L. Peugh.....	Thirteenth District Conference.....	4	3 50
606	Mrs. Frank Randall.....	Thirteenth District Conference.....	4	3 50
607	F. D. Gehant.....	Thirteenth District Conference.....	4	6 39
608	J. H. Martin.....	Thirteenth District Conference.....	4	4 64
609	A. N. Abbott.....	Thirteenth District Conference.....	4	6 70
610	Frances M. Bent.....	Thirteenth District Conference.....	4	2 98
611	Arthur Lumbrick.....	Eighteenth District Conference.....	4	5 50
612	Otis P. Haworth.....	Eighteenth District Conference.....	4	1 80
613	Geo. S. Hoff.....	Eighteenth District Conference.....	4	1 65
614	Chas. Cunningham.....	Eighteenth District Conference.....	4	1 80
615	Mrs. S. A. Wise.....	Eighteenth District Conference.....	4	3 76
616	Claude Taggart.....	Eighteenth District Conference.....	4	5 20
617	John L. Hawker.....	Eighteenth District Conference.....	4	5 52
618	Roy G. Wilcox.....	Eighteenth District Conference.....	4	4 32
619	George W. Schrader.....	Eighteenth District Conference.....	4	4 32
620	Guy Holsapple.....	Eighteenth District Conference.....	4	3 91
621	J. B. Burrows.....	Nineteenth District Conference.....	4	6 50
622	W. K. Bolin.....	Nineteenth District Conference.....	4	2 03
623	C. G. Leeds.....	Nineteenth District Conference.....	4	2 03
624	J. Ray Stanner.....	Nineteenth District Conference.....	4	3 22
625	W. P. Jones.....	Nineteenth District Conference.....	4	2 02
626	W. D. Herrick.....	Nineteenth District Conference.....	4	2 12
627	John L. Costley.....	Nineteenth District Conference.....	4	1 40
628	Mrs. Grace Shuman.....	Nineteenth District Conference.....	4	2 03

Voucher No.	To whom.	For what.	Fund No.	Amount.
629	Mary Daugherty.....	Nineteenth District Conference.....	4	\$2 03
630	Besse Hall.....	Nineteenth District Conference.....	4	2 34
631	Mrs. Geo. L. Pfeifer, Jr.....	Nineteenth District Conference.....	4	2 34
632	John R. Olsby.....	Nineteenth District Conference.....	4	2 34
633	George E. Ewing.....	Nineteenth District Conference.....	4	2 34
634	Jacob A. Lovins.....	Nineteenth District Conference.....	4	2 08
635	O. O. Barker.....	Nineteenth District Conference.....	4	3 65
636	Mrs. B. L. Rosebraugh.....	Nineteenth District Conference.....	4	3 58
637	J. H. Snyder.....	Nineteenth District Conference.....	4	3 22
638	Leonard E. Davis.....	Nineteenth District Conference.....	4	3 22
639	Oscar L. Minter.....	Nineteenth District Conference.....	4	3 52
640	John L. Hufford.....	Nineteenth District Conference.....	4	1 50
641	Mrs. G. C. Outten.....	Nineteenth District Conference.....	4	92
642	Chas. Vance.....	Nineteenth District Conference.....	4	2 12
643	Hugh Ruddock.....	Nineteenth District Conference.....	4	1 26
644	Paul D. Cooper.....	Nineteenth District Conference.....	4	1 26
645	Mrs. Sarah Bloomfield.....	Twentieth District Conference.....	4	2 10
646	O. F. Patterson.....	Twentieth District Conference.....	4	2 10
647	W. E. Nelson.....	Twentieth District Conference.....	4	2 36
648	C. W. Sellers.....	Twentieth District Conference.....	4	2 60
649	Mrs. H. C. Newman.....	Twentieth District Conference.....	4	3 20
650	F. A. Clark.....	Twentieth District Conference.....	4	3 20
651	Mrs. J. C. Lewis.....	Twentieth District Conference.....	4	1 22
652	Fred H. Korty.....	Twentieth District Conference.....	4	1 22
653	Mrs. R. W. Fletcher.....	Twentieth District Conference.....	4	3 20
654	H. C. McCarrel.....	Twentieth District Conference.....	4	3 20
655	J. W. Becker.....	Twentieth District Conference.....	4	3 80
656	E. C. Secor.....	Twentieth District Conference.....	4	2 80
657	H. U. Landon.....	Twentieth District Conference.....	4	3 88
658	L. A. Dickson.....	Twentieth District Conference.....	4	2 95
659	H. C. Knoeppel.....	Twentieth District Conference.....	4	1 22
660	Geo. H. Wiemer.....	Twentieth District Conference.....	4	5 00
661	R. R. Hembrough.....	Twentieth District Conference.....	4	2 00
662	Wm. McCluskey.....	Twenty-first District Conference.....	4	1 86
663	Mrs. Clotilde Harrison.....	Twenty-first District Conference.....	4	1 60
664	W. J. H. Fahrenkrog.....	Twenty-first District Conference.....	4	2 96
665	Cleve Workman.....	Twenty-first District Conference.....	4	1 86
666	F. E. Bauer.....	Twenty-first District Conference.....	4	2 96
667	Mrs. Jennie M. Alkman.....	Twenty-first District Conference.....	4	2 35
668	Henry L. Powkes.....	Twenty-first District Conference.....	4	1 58
669	E. A. Lewey.....	Twenty-first District Conference.....	4	4 10
670	Bessie Douglas.....	Twenty-first District Conference.....	4	6 09
671	J. H. Rainey.....	Twenty-first District Conference.....	4	6 11
672	John M. Hampton.....	Twenty-first District Conference.....	4	7 15
673	G. W. Koonce.....	Twenty-second District Conference.....	4	3 02
674	J. D. Mann.....	Twenty-second District Conference.....	4	2 96
675	Mrs. F. Rose.....	Twenty-second District Conference.....	4	2 72
676	O. F. Weber.....	Twenty-second District Conference.....	4	80
677	Wm. Albert.....	Twenty-second District Conference.....	4	2 00
678	Mrs. Frank Sawyer.....	Twenty-second District Conference.....	4	2 66
679	J. E. W. Miller.....	Twenty-second District Conference.....	4	85
680	W. N. Baltz.....	Twenty-second District Conference.....	4	80
681	W. E. McCaslin.....	Twenty-second District Conference.....	4	3 02
682	Mrs. E. R. DeMoulin.....	Twenty-second District Conference.....	4	3 12
683	Frank Troeckler.....	Twenty-second District Conference.....	4	1 50
684	J. W. Stanton.....	Twenty-second District Conference.....	4	3 52
685	E. L. Rehling.....	Twenty-second District Conference.....	4	1 46
686	E. H. Brucker.....	Twenty-second District Conference.....	4	1 10
687	Mrs. H. Murphy.....	Twenty-second District Conference.....	4	1 30
688	W. C. Heyl.....	Twenty-second District Conference.....	4	1 50
689	Anton Lahr.....	Twenty-third District Conference.....	4	3 00
690	Joe Crews.....	Twenty-third District Conference.....	4	3 00
691	Mrs. E. C. Bargh.....	Twenty-third District Conference.....	4	1 50
692	W. M. Leckrone.....	Twenty-third District Conference.....	4	1 00
693	Louis Bach.....	Twenty-third District Conference.....	4	2 00
694	Mrs. L. B. Porter.....	Twenty-third District Conference.....	4	1 38
695	W. T. Wooden.....	Twenty-third District Conference.....	4	1 38
696	Albert Coffin.....	Twenty-third District Conference.....	4	1 00
697	O. E. McCormick.....	Twenty-third District Conference.....	4	4 00
698	A. F. Janson.....	Twenty-third District Conference.....	4	3 32
699	John E. Crayer.....	Twenty-third District Conference.....	4	3 32
700	J. I. McCarty.....	Twenty-third District Conference.....	4	3 00
701	D. R. Love.....	Twenty-third District Conference.....	4	2 98
702	C. S. Andrus.....	Twenty-third District Conference.....	4	1 52
703	John J. Ewald.....	Twenty-third District Conference.....	4	1 96
704	H. N. Fox.....	Twenty-third District Conference.....	4	1 64
705	O. L. Wakefield.....	Twenty-third District Conference.....	4	2 30
706	J. V. Smith.....	Twenty-third District Conference.....	4	1 80
707	W. E. LeMay.....	Twenty-third District Conference.....	4	2 38
708	Frank W. Keith.....	Twenty-fifth District Conference.....	4	2 30
709	S. W. Jones.....	Twenty-fifth District Conference.....	4	3 06
710	Jas. A. Helms.....	Twenty-fifth District Conference.....	4	75
711	Robt. Lambert.....	Twenty-fifth District Conference.....	4	3 06

Voucher No.	To whom.	For what.	Fund No.	Amount.
712	Mrs. T. S. Browning.	Twenty-fifth District Conference	4	\$ 3 06
713	C. A. Marchildon.	Twenty-fifth District Conference	4	3 82
714	Mrs. Geo. W. Hess.	Twenty-fifth District Conference	4	1 84
715	Chas. O. Otrich.	Twenty-fifth District Conference	4	1 84
716	Geo. W. Hess.	Twenty-fifth District Conference	4	1 84
717	Lloyd F. Cox.	Twenty-fifth District Conference	4	3 82
718	Myrtle W. Cox.	Twenty-fifth District Conference	4	3 82
719	Laura I. Milford.	Twenty-fifth District Conference	4	3 53
720	Mrs. R. C. Mann.	Twenty-fifth District Conference	4	3 51
721	Alice Whitley.	Twenty-fifth District Conference	4	2 91
722	H. S. Dickey.	Twenty-fifth District Conference	4	3 51
723	Harry L. Stubblefield, treasurer.	McLean County Farmers' Institute	5	75 00
724	Jesse Bowman.	Eighteenth District Conference	4	4 98
(Approved May 8, 1916.)				
725	Adams Express Co.	Express.	1	22 39
726	American Express Co.	Express.	1	52 63
727	Wells Fargo & Co., Express.	Express.	1	5 28
728	Central Union Telephone Co.	Exchange and tolls.	1	6 60
729	Western Union Telegraph Co.	Telegraph service.	1	1 25
730	Gravel Springs Co.	Water supply.	1	1 35
731	Helen T. Neville.	Reporting and transcript.	1	188 50
732	H. A. McKeene.	Salary as secretary.	Special	166 66
733	L. M. James.	Salary as stenographer.	2	60 00
734	John S. Fleming.	Salary as messenger.	2	75 00
735	Mrs. H. A. McKeene.	Salary as field worker.	2	83 33
736	Fred L. Hatch.	Services as speaker.	3	10 00
737	Edward Grimes.	Expenses as director.	4	7 42
738	R. B. Swift.	Expenses as director.	4	35 20
739	Henry H. Schwinge.	Expenses as director.	4	13 07
740	D. M. Marlin.	Expenses as director.	4	24 30
741	Grant Balding.	Twenty-fourth District Conference	4	3 50
742	F. W. Reitz.	Twenty-fourth District Conference	4	7 32
743	Mrs. James R. Patton.	Twenty-fourth District Conference	4	10 00
744	Robt. R. Randolph.	Twenty-fourth District Conference	4	8 19
745	Mrs. B. F. Thomas.	Twenty-fourth District Conference	4	4 50
746	J. L. Greenlee.	Twenty-fourth District Conference	4	3 50
747	Mrs. Alice Butler.	Twenty-fourth District Conference	4	1 75
748	Mrs. J. R. Jones.	Twenty-fourth District Conference	4	50
749	Laura Williams.	Twenty-fourth District Conference	4	50
750	C. H. Mossberger.	Twenty-fourth District Conference	4	50
751	John M. Howerton.	Twenty-fourth District Conference	4	2 54
752	Ora Milburn.	Twenty-fourth District Conference	4	2 54
753	L. M. Smith.	Twenty-fourth District Conference	4	2 54
754	Will M. Land.	Twenty-fourth District Conference	4	50
755	N. F. Elder.	Twenty-fourth District Conference	4	1 50
756	P. J. Engles.	Twenty-fourth District Conference	4	10 52
757	Edward Schneider.	Twenty-fourth District Conference	4	7 20
758	C. W. Maulding.	Twenty-fourth District Conference	4	3 20
759	J. T. Garvin.	Twenty-fourth District Conference	4	2 88
760	W. W. Daily.	Twenty-fourth District Conference	4	2 38
761	H. D. Brock.	Twenty-fourth District Conference	4	5 50
762	Chas. B. Miller.	Twenty-fourth District Conference	4	4 50
763	Mrs. Robt. Dale.	Twenty-fourth District Conference	4	2 88
764	Hattie M. Rittenhouse.	Twenty-fourth District Conference	4	10 00
765	Johnson Kanady.	Twenty-fourth District Conference	4	2 64
766	Octavia F. Cook.	Twenty-fourth District Conference	4	2 40
767	J. M. McLain.	Twenty-fourth District Conference	4	3 24
768	J. B. Galbraith.	Twenty-fourth District Conference	4	4 50
769	Mrs. Mattie Miller.	Twenty-fourth District Conference	4	10 00
770	H. Burnett.	Twenty-fourth District Conference	4	1 73
771	B. D. Gates.	Twenty-fourth District Conference	4	2 80
772	G. O. Lewis.	Twenty-fourth District Conference	4	6 24
773	Emma Rebman.	Twenty-fourth District Conference	4	3 34
774	Homer E. Henderson.	Twenty-fourth District Conference	4	3 50
775	Arch Stanhope.	Twenty-fourth District Conference	4	3 50
776	Mrs. Rufus Beard.	Twenty-fourth District Conference	4	7 35
777	A. J. Gillfillan.	Eighteenth District Conference	4	9 24
(Approved May 20, 1916.)				
778	Adams Express Co.	Express.	1	22 39
779	Wells Fargo & Co.	Express.	1	22 21
780	H. A. McKeene.	Postage.	1	100 00
781	Maurer Ice & Coal Co.	Ice supply.	1	1 35
782	Central Union Telephone Co.	Exchange and tolls.	1	5 40
783	Applecroft Experiment Station.	Two library books.	1	2 50
784	The Edw. F. Hartmann Co.	Reporting and transcript.	1	66 77
785	Capitol Engraving Co.	Repair cut, half tone.	1	1 00
786	A. W. Kessberger.	13 16x20 enlargements.	1	195 00
787	A. N. Abbott.	Expenses as director.	4	8 61
788	R. C. Vial.	Expenses as director.	4	13 05
789	H. A. McKeene.	Expenses as secretary.	4	6 17
790	Arthur R. Warren, treasurer.	Boone County Farmers' Institute.	5	75 00
791	Frank E. Culp, treasurer.	Madison County Farmers' Institute.	5	75 00
792	B. J. Kaufman, treasurer.	Woodford County Farmers' Institute.	5	75 00
(Approved June 12, 1916.)				

Voucher No.	To whom.	Express.	For what.	Fund No.	Amount.
793	American Express Co.	Express.		1	\$ 72 70
794	A. C. McClurg & Co.	One library book		1	1 58
795	Coe Brothers.	Office supplies		1	2 05
796	H. A. McKeene	Postage		1	100 00
797	H. G. Easterly	Field worker		2	5 00
798	Mrs. H. A. McKeene	Salary as field worker		2	83 33
799	L. M. James	Salary as stenographer		2	60 00
800	John S. Fleming	Salary as messenger		2	75 00
801	H. A. McKeene	Salary as secretary		Special	166 66
802	H. E. Young	Expenses as director		4	7 60
803	H. A. McKeene	Expenses as secretary		4	21 22
804	H. G. Henry, treasurer	Adams County Farmers' Institute		5	75 00
805	C. C. Ames, treasurer	Lake County Farmers' Institute		5	75 00
806	James Eymann, treasurer	Macon County Farmers' Institute		5	75 00
807	Frank Brown, treasurer	Will County Farmers' Institute		5	75 00

(Approved June 22, 1916.)

Your auditor would further report that he has checked the books of the secretary with the auditor's books, the books of the treasurer with the cancelled warrants, and found them accurate and correct.

The following is a summary of all the financial transactions to June 30, 1916:

Fund 1. Office expenses—Appropriation available July 1, 1915	\$2,960 00
Bills paid to June 30, 1916	\$2,051 13
Bills payable June 30, 1916	908 87
Fund 2. Salaries—Appropriation available July 1, 1915	2,960 00
Bills paid to June 30, 1916	\$2,974 33
Bills payable June 30, 1916	125 67
Fund 3. Speakers and Instructors—Appropriation available July 1, 1915	3,100 00
Bills paid to June 30, 1916	\$5,996 00
Bills payable June 30, 1916	4 00
Fund 4. General expenses—Appropriation available July 1, 1915	6,000 00
Bills paid to June 30, 1916	\$4,193 37
Bills payable June 30, 1916	806 63
Fund 5. County Institutes—Appropriation available July 1, 1915	5,000 00
Bills paid to June 30, 1916	\$6,927 82
Bills payable June 30, 1916	722 18
Salary of Secretary—Appropriation available January 1, 1916	7,650 00
Bills paid to June 30, 1916	\$999 96
Bills payable June 30, 1916	04
Total appropriation available July 1, 1915 and January 1, 1916	1,000 00
Total bills paid to June 30, 1916	\$25,710 00
Total bills payable June 30, 1916	2,567 39
	\$25,710 00

FRANK I. MANN, Auditor.

REPORTS OF COUNTY INSTITUTES, 1915-16.

County.	Number of days.	Number of sessions.	Attend- ance.	Total cost.	State paid.	County paid.
Adams.....	6	24	3,000	\$400 00	\$75 00	\$150 00
Alexander.....	3	8	6,000	850 00	75 00	50 00
Bond.....	3	13	6,000	731 44	75 00	200 00
Boone.....	7	21	425	200 00	75 00	200 00
Brown.....	3	8	1,600	200 00	75 00	-----
Bureau.....	2	5	900	175 00	75 00	50 00
Calhoun.....	2	5	470	150 00	75 00	75 00
Carroll.....	2	5	350	83 82	75 00	-----
Cass.....	-----	-----	-----	-----	-----	-----
Champaign.....	6	15	2,040	200 48	75 00	150 00
Christian.....	3	9	900	235 00	75 00	200 00
Clark.....	4	10	750	125 00	75 00	-----
Clay.....	3	8	1,000	245 53	74 53	150 00
Clinton.....	2	6	1,500	375 00	73 93	100 00
Coles.....	3	8	650	73 60	73 60	-----
Cook.....	9	21	3,540	221 76	75 00	-----
Crawford.....	4	10	913	150 00	75 00	50 00
Cumberland.....	2	4	326	35 90	35 90	-----
Dekalb.....	8	11	1,500	90 00	75 00	-----
Dewitt.....	9	13	1,080	151 71	69 15	-----
Dotugas.....	3	8	800	186 95	75 00	150 00
Dupage.....	3	7	2,000	750 00	75 00	300 00
Edgar.....	12	48	960	575 00	75 00	200 00
Edwards.....	2	7	1,200	90 00	27 75	-----
Effingham.....	5	12	500	90 00	75 00	150 00
Fayette.....	5	12	3,700	180 00	75 00	50 00
Ford.....	18	36	3,200	161 43	75 00	-----
Franklin.....	6	11	6,000	425 00	75 00	75 00
Fulton.....	4	12	6,700	675 00	75 00	200 00
Gallatin.....	2	5	550	85 28	75 00	-----
Greene.....	2	5	500	85 00	51 81	-----
Grundy.....	4	12	1,335	142 43	75 00	75 00
Hamilton.....	3	5	2,000	175 00	75 00	-----
Hancock.....	7	16	1,000	200 00	75 00	75 00
Hardin.....	2	5	600	140 00	75 00	-----
Henderson.....	6	13	1,850	325 00	75 00	300 00
Henry.....	3	6	1,200	650 00	75 00	75 00
Iroquois.....	5	13	1,600	500 00	75 00	100 00
Jackson.....	2	4	400	90 00	75 00	-----
Jasper.....	5	10	2,000	75 12	75 00	-----
Jefferson.....	3	7	2,500	165 00	75 00	100 00
Jersey.....	4	9	1,100	290 00	75 00	100 00
Jo Daviess.....	7	24	1,200	300 00	75 00	150 00
Johnson.....	7	16	950	194 56	75 00	150 00
Kane.....	3	6	1,000	225 00	75 00	300 00
Kankakee.....	6	15	1,200	650 00	75 00	300 00
Kendall.....	3	7	900	145 00	75 00	100 00
Knox.....	-----	-----	-----	-----	-----	-----
Lake.....	9	17	2,450	550 00	75 00	300 00
La Salle.....	5	25	9,000	900 00	75 00	300 00
Lawrence.....	3	7	1,000	75 00	75 00	-----
Lee.....	3	8	1,135	59 00	59 00	-----
Livingston.....	5	11	2,000	571 45	75 00	750 00
Logan.....	3	7	2,500	600 00	75 00	150 00
Macon.....	3	8	11,000	1,950 00	75 00	300 00
Macoupin.....	2	4	1,300	101 17	75 00	123 00
Madison.....	2	7	1,200	250 00	75 00	100 00
Marion.....	5	9	15,000	225 00	75 00	-----
Marshall.....	3	7	350	300 00	75 00	125 00
Mason.....	3	8	5,000	500 00	75 00	225 00
Massac.....	2	4	300	60 00	34 24	-----
McDonough.....	3	14	1,870	182 66	75 00	150 00
McHenry.....	5	20	1,600	250 00	75 00	150 00
McLean.....	13	32	2,000	210 00	75 00	100 00
Menard.....	2	5	250	55 05	55 05	-----
Mercer.....	3	8	500	90 00	75 00	-----
Monroe.....	3	7	9,000	357 00	75 00	25 00
Montgomery.....	5	36	3,500	374 54	75 00	150 00
Morgan.....	4	7	500	175 00	75 00	125 00
Moultrie.....	4	10	650	275 00	75 00	100 00
Ogle.....	2	6	1,700	223 29	75 00	100 00
Peoria.....	3	9	2,000	850 00	75 00	-----
Perry.....	2	5	500	125 00	75 00	-----
Platt.....	3	8	2,000	813 43	75 00	200 00
Pike.....	2	7	750	95 00	75 00	100 00
Pope.....	2	6	2,200	141 70	75 00	25 00

REPORTS OF COUNTY INSTITUTES, 1915-16—Concluded.

County.	Number of days.	Number of sessions.	Attend- ance.	Total cost.	State paid.	County paid.
Pulaski.....	2	5	375	\$ 80 14	\$75 00	\$ 75 00
Putnam.....	2	4	1,500	193 05	75 00	125 00
Randolph.....	3	6	300	75 00	75 00	
Richland.....	2	5	1,500	64 50	64 50	
Rock Island.....	6	18	5,000	218 44	75 00	150 00
Saline.....	4	5	3,000	825 00	75 00	300 00
Sangamon.....	2	6	850	126 50	75 00	75 00
Schuyler.....	3	8	1,750	180 00	75 00	
Scott.....	3	3	1,000	200 00	47 88	
Shelby.....	3	8	3,800	430 99	75 00	150 00
St. Clair.....	5	14	1,500	201 00	75 00	
Stark.....	2	5	750	80 00	51 98	
Stephenson.....	3	9	500	354 01	75 00	300 00
Tazewell.....						
Union.....	5	15	2,000	75 25	75 00	
Vermilion.....	3	7	1,350	300 00	75 00	25 00
Wabash.....	3	6	530	125 00	75 00	50 00
Warren.....	3	8	800	120 00	75 00	
Washington.....	3	7	345	71 20	61 40	
Wayne.....	3	7	3,000	72 10	72 10	
White.....	5	13	1,300	322 50	75 00	100 00
Whiteside.....	4	8	5,000	620 11	75 00	300 00
Will.....	3	6	1,000	300 00	75 00	100 00
Williamson.....	6	12	3,000	230 00	75 00	300 00
Winnebago.....	6	20	1,200	300 00	75 00	300 00
Woodford.....						
Total.....	400	1,042	202,494	\$28,188 89	\$7,077 82	\$10,270 00

SUMMARY.

Number of days occupied by institutes.....	400
Number of sessions.....	1,042
Attendance.....	202,494
Cost.....	\$28,188 89
State paid.....	7,077 82
County paid.....	10,270 00

Respectfully submitted.

H. A. McKEENE, *Secretary.*

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